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ABSTRACT

This study aims to: (1) determine if a relationship exists between faculty characteristics and attitudes concerning various forms of instructional technology; (2) document information regarding instructional technology training; (3) determine if a relationship exists between faculty characteristics and attitudes concerning distance education; (4) determine if a relationship exists between faculty characteristics and attitudes concerning continuing professional education; (5) document the number of Radiologic Technology programs that have joined partnerships with area hospitals and to identify the number of programs that are offered per year; (6) document whether or not Radiologic Technology faculty provide continuing education programs for radiographers in area hospitals; and (7) document how and how often Radiologic Technology programs provide continuing professional education programs for radiographers in area hospitals. The study utilized the survey method, including 115 of 123 surveys, for a response rate of 93%. Results revealed significant differences between the genders, relative to attitudes concerning the purpose of, participation in, and the offering of continuing professional education. In addition, even though the existence of integrated facilities was not widespread, a majority of the respondents indicated that their departments do offer some form of continuing professional education to area radiographers. Finally, a majority of respondents also indicated that institutional support and training for using instructional technologies and distance education was less than adequate. Survey instrument is appended. (Contains 73 tables and 88 references.) (Author/NB)

Creating Integrated Facilities: Community College Radiologic Technology Faculty Attitudes Towards Instructional Technology, Distance Education, and Continuing Professional Education

Lauren Brower Noble

ABSTRACT

NOBLE, LAUREN BROWER. Creating Integrated Facilities: Community College Radiologic Technology Faculty Attitudes Towards Instructional Technology, Distance Education, and Continuing Professional Education. (Under the direction of Dr. J. Conrad Glass, Jr.)

Community colleges espouse the mission of providing services to their external constituents; external constituents refer to any individuals who want to or need to participate in educational activities. Some community colleges are already discovering innovative ways to offer educational activities to their constituents. One method of delivery that is gaining notoriety is distance education. Distance education results in the combining of two or more institutions; the resultant partnership may be referred to as *integrated facilities*. Integrated facilities must be accepted by the community college faculty, and in this case, the Radiologic Technology faculty in order to provide area hospital radiographers with continuing professional education. The acceptance of integrated facilities by faculty members may be hampered if they do not have favorable attitudes towards instructional technology, distance education, and continuing professional education.

Therefore, this research profiles the demographic characteristics of community college Radiologic Technology faculty nationwide as well as their attitudes towards instructional technology, distance education, and continuing professional education. This research also provides data concerning the existence of integrated facilities as well as to what extent and by what means Radiologic Technology faculty offer continuing professional education to area radiographers. In addition, factual information regarding the use and knowledge of instructional technologies is presented, as well as information regarding institutional training and support for using instructional technologies and participating in the provision of distance education programs.

The survey method of research was implemented to gather the necessary data. The results revealed significant differences between the genders relative to attitudes concerning the purpose of, participation in, and the offering of continuing professional education. In addition, even though the existence of integrated facilities was not widespread, a majority of the respondents

indicated that their departments do offer some form of continuing professional education to area radiographers. Lastly, a majority of respondents also indicated that institutional support and training for using instructional technologies and distance education was less than adequate.

CREATING INTEGRATED FACILITIES: COMMUNITY COLLEGE RADIOLOGIC TECHNOLOGY FACULTY ATTITUDES TOWARDS INSTRUCTIONAL TECHNOLOGY, DISTANCE EDUCATION, AND CONTINUING PROFESSIONAL EDUCATION

by

LAUREN BROWER NOBLE

A dissertation submitted to the Graduate Faculty of
North Carolina State University
in partial fulfillment of the
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Doctor of Education

ADULT AND COMMUNITY COLLEGE EDUCATION

Raleigh

2000

APPROVED BY:

_____ _____

_____ _____

Chair of Advisory Committee

DEDICATION

I dedicate this research to my husband, Robert P. Noble. Without his patience, understanding, emotional and financial support, I would not have achieved this goal. Thank you for being a great source of inspiration for my goals and ambitions. Thank you for your unconditional love that makes everyday worth living. In addition, I must acknowledge three other important individuals in my life-my son, John, and my parents, William and Laraine Brower. John provided me with love and joy during the time it took me to complete this research and my parents provided me with the love, support and encouragement to keep me going.

BIOGRAPHY

Lauren Brower Noble was born in Passaic, New Jersey were she lived until the age of six. At that time she moved to Bristol, Tennessee and lived there until she was thirteen. Lauren moved with her family to Sanford, North Carolina where she entered junior high school. Upon graduating from high school in 1985, Lauren attended the University of North Carolina at Chapel Hill from 1985-1989 earning a Bachelor of Science Degree in Radiologic Science. From there, Lauren was admitted to the Master's Degree program in the Department of Adult and Community College Education at North Carolina State University. During her time in the program, Lauren worked as a research assistant and as a radiographer. In August of 1992, Lauren joined Vance-Granville Community College as a Radiologic Technology faculty member.

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Chapter I

Introduction

Radiography celebrated its 100th birthday November 8, 1995. Since its inception in Germany over 100 hundred years ago, the field's technology has greatly advanced and expanded. Initially manufactured for radiographing the skeletal system, modern x-ray equipment comprises a vast array of imaging capabilities (i.e., Computerized Tomography, Cardiovascular-Interventional Radiography, Nuclear Medicine, Magnetic Resonance Imaging, Mammography, Radiation Therapy, and Ultrasound Technology). Within each imaging modality, technology remains a dynamic force driving medical care to new horizons and dimensions; procedures once thought impossible are now routine occurrences. Some results of this advanced technology are: (a) individuals now have greater life expectancies, (b) medical costs have increased, and (c) continuing professional education is needed in order to stay abreast of new information and technology.

Advanced technology has resulted in a greater life expectancy span for individuals; illnesses and diseases that once resulted in an individual's demise may now be successfully treated. This treatment, however, is not without a price. As technology becomes more advanced, so do medical costs. More than ever medical costs are being scrutinized by insurance companies and ways to curb costs are being implemented. Although these two aspects of health care are pertinent to understand, this research focuses on what advanced technology demands for those who perform the procedures and work with the equipment. To ascertain that knowledge and skills are maintained, health care workers must engage in continuing professional education. According to Price (1987, p. 140), "the development of a practitioner can and should be provided for by continuing professional education". Health care workers will fail to develop, in both knowledge and skills, if continuing professional education is unavailable or not easily accessible. As a result, quality patient care is jeopardized. Every health care worker should participate in continuing professional education regardless of whether it is mandated for his/her given profession.

In order to encourage participation in continuing professional education, and in the case of radiographers to promote participation above and beyond what is required, it must be available and easily accessible. Various means exist by which radiographers can receive continuing professional education. One example is that which is provided by hospital/radiology departments. Other examples include professional journals, conferences, meetings, and tapes, which encourage these professionals to grow and expand their professional knowledge base. These resources have become quite common over the past few years, due to mandated continuing professional education, and they have their positive and negative attributes.

Professional journals provide a convenient means for individuals to obtain knowledge; individuals can subscribe to these journals and have them delivered to their doorstep. The journals may be read when the individual has time; in addition, if material is not understood, it can be reread. The negative aspect, however, is that individuals do not get to interact with other professionals. Professionals can learn a lot from interacting with one another (i.e., sharing personal experiences or something they may have read). Conferences and meetings, however, provide professionals with the opportunity to come together and share information and personal experiences; unfortunately, not every radiographer can attend every meeting – most hospitals operate twenty-four hours a day, and the Radiology Department cannot shut down for individuals to attend these meetings. Lastly, tapes, whether audio or video, that are purchased either by the radiology department or the radiographer allow individuals to listen or view them at their leisure. As with journals, if information is not understood, it can be replayed. These media provide an invaluable means by which health care workers access continuing professional education, and are currently the most common sources for this service.

One source, however, that has recently gained notoriety is distance education; this form of technology may be implemented for students taking off-site classes for credit as well as for employees participating in continuing professional education programs at remote sites. Technology has greatly increased over the past several years; computers, digital scanners, fax

machines, modems, and the internet all make it possible for individuals to communicate quickly and effectively. In turn, distance education takes advantage of technology and allows individuals to communicate and learn, for example, via video conferencing and video broadcasting (Pocorobba, 1995). Universities, such as North Carolina State University, have already joined in the technology parade by offering distance education classes; the main class is taught on campus and broadcast to various sites across the state. Pocorobba refers to this combining of institutions as *integrated facilities*. Two additional institutions that have linked together are Hudson Valley Community College and Texas Tech University (Pocorobba). Hudson Valley Community College in New York currently has the capacity to communicate with other colleges through videos and teleconferencing. The Health Science Center Library/Telecommunications Conference Center at Texas Tech University will provide interactive video consultations between on-campus medical specialists of the four college campuses and off-site health care providers. In addition, this system will provide satellite-based continuing professional education.

The benefits of such integration will be discussed in the literature review section; however, it must be noted that many colleges view the common purpose behind integrated facilities as the ability to increase interaction between themselves and important external constituents (Pocorobba, 1995). This researcher views important constituents as those individuals who want to or need to participate in educational activities. The reasons for increasing interactions between colleges and external constituents may vary from institution to institution. However, when considering the mission of the community college system, one notes that these institutions have an obligation to meet the needs of the *community* (Harlacher, 1989; Shearon & Tollefson, 1989). Hence, this researcher believes that community colleges should take an active role in providing distance education services for its constituents.

Problem Statement and Purpose

Due to increasing technology and the need to delivery quality patient care, radiographers must participate in continuing professional education. Knowledge and skills may become

obsolete if radiographers fail to seek ways to maintain appropriate levels of professional practice. As previously mentioned, various means exist by which radiographers may obtain continuing professional education credit. Not all of these means, however, are easily accessible; attending conferences and meetings oftentimes requires radiographers to rotate who attends because hospital radiology departments are unable to close their doors for this purpose.

In addition, community colleges espouse the mission of providing services to their external constituents; external constituents refer to any individuals who want to or need to participate in educational activities. Some community colleges are already discovering innovative ways to offer educational activities to their constituents. One method of delivery that is gaining notoriety is distance education. Distance education results in the combining of two or more institutions; the resultant partnership may be referred to as *integrated facilities*. Integrated facilities must be accepted by the community college faculty, and in this case, the Radiologic Technology faculty in order to provide area hospital radiographers with continuing professional education. The acceptance of integrated facilities by faculty members may be hampered if they do not have favorable attitudes towards instructional technology, distance education, and continuing professional education.

Based on the aforementioned information, this research investigates, for the first time, if integrated facilities exist between community college Radiologic Technology programs and area hospitals and what these community colleges are doing in regards to offering continuing professional education programs to area radiographers. In addition, this research also investigates Radiologic Technology faculty attitudes towards instructional technology, distance education, and continuing professional education. Information regarding these attitudes may assist community college administration in creating and maintaining effective integrated facilities.

Data elicited from this research will be important to the Radiologic Technology field in that it will, for the first time, provide a profile of the accessibility of continuing professional education for radiographers through integrated facilities. In addition, data elicited concerning

attitudes towards instructional technology, distance education, and continuing professional education may be useful in devising educational programs for Radiologic Technology faculty (i.e., programs may be developed, perhaps by the community college, to promote positive attitudes towards implementing instructional technology as well as continuing professional education programs through distance education). The objectives of this research include the following:

1. To provide a demographic profile of community college Radiologic Technology faculty.
2. To document various forms of instructional technology faculty have knowledge about and/or have experience using.
3. To determine if a relationship exists between faculty characteristics and attitudes concerning various forms of instructional technology.
4. To document information regarding instructional technology training.
5. To determine if a relationship exists between faculty characteristics and attitudes concerning distance education.
6. To document information regarding distance education training and distance education compensation.
7. To determine if a relationship exists between faculty characteristics and attitudes concerning continuing professional education.
8. To document the number of Radiologic Technology programs that have joined partnerships with area hospitals and to identify the number of programs that are offered per year.
9. To document whether or not Radiologic Technology faculty provide continuing professional education programs for radiographers in area hospitals.
10. To document how and how often Radiologic Technology programs provide continuing professional education programs for radiographers in area hospitals.

The literature review will focus on an overview of adult education, continuing professional education, the community colleges' missions, and various types of instructional

technologies, including distance education. However, before presenting the literature review it is necessary to provide information relative to the current profile of the field, research assumptions and limitations, and definitions.

Current Profile

Currently, in the United States, there are 140 Radiologic Technology programs offered at community colleges (this number includes programs listed under colleges that identify themselves as "community colleges" as well as colleges that identify themselves as "community/technical colleges") (American Medical Association, 1998). All of these programs are accredited by the Joint Review Committee on Education in Radiologic Technology (JRCERT). Upon graduating from one of these accredited programs, individuals are eligible to sit for the national exam sponsored by the American Registry of Radiologic Technologists (ARRT). Passing the exam entitles the individual to use the credential, RT(R), meaning Registered Technologist in Radiography.

As of April 1999, the total number of registered radiographers was 219,010 including the aforementioned specialty modalities (with the exception of ultrasound – this specialty is regulated by another registry board) (American Registry of Radiologic Technologists, 1999). The number of individuals registered in radiography alone was 208,174. It is uncertain how many of these individuals are employed in hospitals, doctors' offices and clinics, and educational institutions. However, it is accepted that hospitals employ a majority of the radiographers due to hospitals providing a bulk of all radiographic procedures and treatments.

Regardless of where a radiographer is employed, he or she must abide by the new rules governing continuing professional education. Continuing professional education for radiographers was mandated beginning January 1, 1995. Briefly stated, radiographers must obtain 24 credit hours (1 credit hour equals 50 minutes of an educational activity) over a two- year period in order to remain in good standing. Failure to obtain these credits will result in probationary status, and, if not cleared, will ultimately end in forfeiture of one's certificate (note

that the purpose of this research is not to discuss in detail the continuing professional education requirements for radiographers; however, individuals who desire further information should refer to the *Annual Report to Registered Technologists* published by [The American Registry of Radiologic Technologists, 1999]). When appropriate, however, information concerning continuing professional education for radiographers is provided in order to facilitate the understanding of certain aspects in the literature review.

Assumptions and Limitations

Mandating continuing professional education has resulted in the need for providers to be creative in ways to deliver accessible programs and materials. Therefore, this supports the need for a foundation study, which focuses on the importance of *integrated facilities* for the purpose of providing continuing professional education for radiographers. This research will be based upon quantitative responses to a self-administered questionnaire to be completed by a nationwide random sample of community college Radiologic Technology program faculty. This research is based upon the following assumptions:

- Radiologic Technology is considered to be a *professional* field.
- continuing professional education is necessary in order to stay abreast of new information and technologies for the purposes of promoting self-growth and delivering quality patient care.
- distance education can provide radiographers with accessible continuing professional education and aid community colleges in fulfilling their mission of meeting community needs.
- technology is ever increasing; therefore, instructors must at least be knowledgeable concerning instructional technology and how it can enhance classroom learning.
- hospitals employ a majority of radiographers.

– community colleges assume the mission of providing services (i.e., continuing education) to the community.

Based on these assumptions, community colleges, specifically the Radiologic Technology programs, should consider how they can contribute to the skills, knowledge, and professional growth needed by practicing radiographers.

This research is limited to Radiologic Technology faculty in community colleges and community/technical colleges. The results are intended to profile the current status of integrated facilities and attitudes concerning continuing education, distance education, and instructional technology. Therefore, the results may not be applicable to other health care programs offered at the community colleges.

In addition, this research focuses only on colleges identifying themselves as community colleges and community/technical colleges. The rationale behind this is due to the aforementioned mission of community colleges; hence, a limitation may result from the exclusion of colleges listed as "city colleges" or "technical colleges". Some of these colleges may have community-oriented missions.

Another limitation may result from the uncertainty pertaining to the number of Radiologic Technology faculty at each sample population institution. The researcher, based on a ratio scheme explained in Chapter 3, mailed surveys to the Program Director of each Radiologic Technology program within the sample population. Some programs may have received too many surveys, whereas some programs may not have received enough. However, no program ever contacted the researcher to request additional surveys.

Lastly, a second mailing was not conducted which may have increased the response rate. However, 47% (N=100) of the Program Directors indicated that they had distributed the surveys which represents a good response rate for survey research. Of the 123 surveys that were distributed, 115 usable surveys were received by the researcher resulting in a 93% response rate.

Therefore, due to the good initial response rate and the volume of information to be coded and analyzed, the researcher did not conduct a second mailing.

Definitions

In order to facilitate the reading of the literature review, as well as guide the understanding of the conceptual framework, several definitions must be clarified. Following are definitions for *adult education, distance education, continuing professional education, instructional technologies*, and *Radiologic Technology*.

Adult Education –	"the deliberate, systematic, and sustained effort to transmit, evoke, or acquire knowledge, attitude, values, or skills" (Darkenwald & Merriam, 1982, p. 9) for the purpose of self-growth and/or institutional survival.
Continuing Professional Education –	meeting the educational needs of professionals (Azzaretto, 1987).
Distance Education –	providing access to educational programs through the implementation of various media (i.e., print, electronic media) (MacBrayne, 1995).
Instructional Technology –	the design and implementation of technological devices to aid in the teaching and learning process (Knapper, 1982a).
Integrated Facilities –	the combining of institutions via distance education (Pocorobba, 1995).

Radiologic Technology –	"a profession oriented toward the diagnosis and treatment of trauma and disease" (Torres, 1997, p. 2). Individuals who work in this capacity are referred to as *radiographers* (American Registry of Radiologic Technologists, 1998).

Chapter II

Review of Literature

The increasing demand for quality patient care coupled with advancing technology has created the need for radiographers to participate in continuing professional education. As previously noted, part of this research will focus on integrated facilities – linkages between community colleges and hospitals. According to Harlacher and Gollattscheck (1992), community colleges are emerging as leaders in creating linkages within their communities and they refer to this linkage as building *learning communities*. The objective of building learning communities is to improve community life, both socially and economically through the coordination and collaboration among individuals, community colleges, and businesses/industries. It is through this coordination and collaboration that community's needs and issues are addressed, and, subsequently, potential solutions proposed.

What role does the community college play in building these learning communities? They serve to facilitate the linkages between themselves and their respective communities. Linkages are established through coordination and collaboration so that the community college can assist with meeting the community's needs. One way in which this is accomplished is by the community college extending itself to the community by offering programs at convenient locations (Harlacher & Gollattscheck, 1992). Prime examples of this are on-site job training programs that community colleges provide for local businesses and industries. According to Watkins (1989), adult education in business and industry is the fastest growing segment of the adult education field. This is not hard to believe when one considers how rapidly information and technology change; individuals must receive education or training in order to maintain a current level of competency. As a result, hospitals, which are classified as businesses or industries, can also benefit from linking with community colleges. What this research investigates, however, is not the on-site training and education associated with linkages, but rather, a more advanced

approach to education – providing distance education to the hospitals through *integrated facilities*.

A review of the literature revealed that no studies have been conducted to profile the relationship (in the form of integrated facilities) between community colleges with Radiologic Technology programs and area hospitals. Therefore, in order to assess this type of partnership, this literature review focuses on (a) the concept of adult education, including characteristics of adult learners; (b) the concept of continuing professional education, including the community college's role in providing this service, faculty member considerations, and adult attitudes towards continuing education; (c) the concept of distance education, including its definition and benefits, faculty member considerations and attitudes; and (d) the concept of instructional technology, including faculty attitudes. However, before beginning these segments of the literature review, some background information pertaining to the field of Radiologic Technology is warranted in order to provide a frame of reference.

Background

Terminology.

> Throughout history, radiographers have been tagged with various labels such as X-ray Technician, X-Ray Technologist, Radiologic Technician, Radiologic Technologist, and Radiographer. Arguments over semantics stem from the educational levels of these individuals. As educational trends moved from informal training to formal educational programs, terminology changed. Currently, the term "Radiographer" is the accepted name for these professionals (American Registry of Radiologic Technologists, 1988). Therefore, for the sake of clarity, the term "radiographer" will be used throughout this research. (Brower, 1992, pp. 3-4)

History.

In 1895 Wilhelm Roentgen of Germany discovered x-rays, and a few days after their discovery the first x-ray was taken of his wife's hand (Bushong, 1984). It was recognized immediately that this new discovery had great potential in the medical field; and from 1895 to the present, ionizing radiation, or x-rays, has become an important and integral segment of the healthcare field. Without x-rays, diagnosis and treatment of many injuries, disorders, and diseases would be virtually impossible. (Brower, 1992, p. 4)

Since its beginnings, Radiologic Technology has evolved into a multifaceted, specialized field incorporating the skills and knowledge of radiologic technologists and radiologists. Originally, Radiologic Technology was practiced by "x-ray specialists"; however, as the field began to advance with changes in technology and information the specialists needed individuals who were trained and educated to assist as well as solely perform radiographic procedures. Following is a brief, but yet accurate account of the evolution of radiologic technologists:

According to Soule [1974], in the early years of radiography, x-ray machines were rigged up by scientists, physicians, physicists, dentists, pharmacists, and photographers. What was not immediately recognized, however, were the effects radiation could have on the body; hence, early medical applications of x-rays resulted in burns, loss of limbs and even death from overexposure. Due to the realization that radiation posed potentially harmful effects to its users, the excitement over this new equipment began to dwindle among these groups. As a result, physicians, commonly referred to as "x-ray specialists", began to take over the use of x-ray equipment.

Soule (1974) notes that the point at which physicians took over the x-ray equipment marked the evolution of radiographers. Up through the 1930's physicians hired men and women to work as apprentices in private offices or hospitals. These early day apprentices were taught how to position patients, make x-ray exposures, and develop

the plates. The focus of radiography during this period was on on-the-job training with no emphasis on didactic material.

According to Soule (1974), the 1930's through the 1960's saw a surge in on-the-job training coupled with didactic material. Influenced by Ed. C. Jerman, an engineer at General Electric, hospital-based programs began to evolve to provide practical training and didactic material for radiographers. Although the primary focus was on practical aspects, this was a start for the didactic education of radiographers.

From the 1960's to the present day, the evolvement of community colleges has resulted in a shift from hospital-based radiography programs to community college-based radiography programs (Soule, 1974). According to Ward (1979), on-the-job training fulfilled the needs of the hospitals, but with increasing technology more knowledge and skills were needed for the operation of the x-ray equipment. Four reasons Ward attributes to the reduction in hospital-based programs and the increase in community college and university programs are (a) the lack of funding, (b) trends in credentialing, (c) inability to attract and retain qualified instructors, and (d) the lack of time to provide students with didactic material. As a result of these reasons, community colleges, and eventually universities, picked up the didactic end of the curriculum while working in conjunction with hospitals to provide space for the clinical training. (Brower, 1992, pp. 4-6)

Adult Education

Definition.

Before engaging in a discussion pertaining to continuing professional education, one must possess an understanding of the field within which continuing professional education is embedded. Continuing professional education is but one segment included within the broad field of Adult Education. Adult education may be viewed as ranging from schooling to recreational activities, hence, obscuring the boundaries of what is and is not considered to be a part of adult education (Courtney, 1989). Therefore, given this broad range of what adult education may or may not be, it is no wonder that discrepancies exist concerning a definition for the field. Reading various sources reveals that numerous definitions of *adult education* exist. Following is an excerpt from Brower's (1992, pp. 15-17) thesis describing the semantic debate found in the literature:

> The term "adult" has different meanings to different individuals. In the literature review, three common definitions were attributed to the classification of adults. First, adults can be classified according to age or biological maturity (Houle, 1972; Paterson, 1979; Darkenwald & Merriam, 1982). In our society this is generally around the age of 18 - when an individual can register to vote. Second, Knowles (1980) and Darkenwald and Merriam (1982) classify adults as those who are psychologically mature - that is, the extent to which individuals have autonomy and perceive themselves to be adults. Third, adults can be defined socially. Socially refers to individuals who have assumed normal adult roles (i.e., spouse, worker, parent) (Houle, 1972; Knowles, 1980; Darkenwald & Merriam, 1982).
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> For the purpose of this research, the term "adult" refers to one's biological, psychological, and social maturity based on the following rationale: biologically, radiographers are 18 years of age or older; psychologically, radiographers are assumed to

be mature in order to make *rationale* decisions concerning equipment operation and healthcare ethics; and socially, radiographers assume the adult role as worker.

The review of literature presents a wide range of definitions of adult education; and the distinguishing factor between these various definitions rests upon one's view of the purpose of adult education. Education can serve three purposes: (a) acquisition of knowledge for the sake of knowledge, (b) acquisition of knowledge for self-fulfillment or self-growth, and (c) acquisition of skills and/or knowledge for individual and/or societal improvement (Elias & Merriam, 1980). One's definition may be guided by a singular purpose or by a combination of these purposes.

The definition used as a foundation for this research is from Darkenwald and Merriam (1982): "adult education is a process whereby persons whose major social roles are characteristic of adult status undertake systematic and sustained learning activities for the purpose of bringing about changes in knowledge, attitudes, values, or skills" (p. 9) for the purpose of self-growth and/or institutional survival.... From the literature reviewed, this definition was the most complete and widely used definition for adult education. The last segment of the definition, which was not quoted from Darkenwald and Merriam (1982), is included due to the above discussion pertaining to the purposes of education.

Purpose, Philosophy, and Assumptions.

As previously mentioned, adult education is a very broad field encompassing a vast array of programs and activities. What one considers to be a viable adult learning program or activity depends upon one's view concerning the field's purpose. In fact, Darkenwald and Merriam (1982) note that the purposes of adult education have varied since the beginning of the movement. Basically speaking, however, these purposes can be summed up according to the following categories: (a) to facilitate personal growth (Beder, 1989; Brookfield, 1986; Darkenwald & Merriam, 1982; Knowles, 1980), (b) to promote productivity among individuals and to elicit desired behaviors (Beder, 1989; Darkenwald & Merriam, 1982; Tyler, 1949), and (c)

to promote social change (Beder, 1989; Darkenwald & Merriam, 1982; Freire, 1970). It is these general purposes that, in turn, guide the educator's philosophy concerning adult education. Currently, there are five common philosophies that guide the adult education field – liberal, progressive, behaviorist, humanistic, and radical. While a complete critical review and analysis of these philosophies are out of the scope of this research, the brief discussion presented serves to provide some insight to what educators must consider when planning for continuing education programs. Individuals interested in a more thorough understanding of these philosophies are encouraged to consult the aforementioned sources. Hence, what follows is a brief discussion of each philosophy including the assumptions underlying each view.

First, the liberal philosophy focuses on developing the intellectual powers of the mind (Elias & Merriam, 1980). Developing the intellect creates in individuals the skills of critical thinking, reflection, and analysis. Educators believe that these skills are best taught through reading, instruction, and discussion in grammar, rhetoric, philosophy, religion, mathematics, and the natural sciences. Due to the goal of liberal education, the main focus is on the role the instructor assumes in the classroom setting. The instructor assumes the active role as lecturer and the learner assumes the passive role as listener. In this situation, the instructor is clearly viewed as the authority figure (Elias & Merriam, 1980; White & Brockett, 1987). An example of this philosophy is exhibited in the Great Books program, which focuses on reading the classics (Elias & Merriam). Experimentation and projects are not promoted.

Second, humanistic education believes in helping individuals reach their fullest potentials (Elias & Merriam, 1980; Knowles, 1980). As a result, humanistic educators serve as facilitators while placing the learners at the heart of the learning activities. Due to the fact that the learners are the primary focus with this philosophy learning content is negotiated by the facilitator and the learners (Brookfield, 1986). The content is not as stringent here as it is with liberal education. Learners' wants and needs are taken into consideration when planning educational programs.

Therefore, this leaves room for activities that may be geared more towards recreation and relaxation than towards critical thinking and reflection.

Third, progressive education takes a more pragmatic approach then does liberal or humanistic education. Progressive education strives to assist individuals in becoming productive in society and staying abreast of the current changes taking place (Darkenwald & Merriam, 1982; Elias & Merriam, 1980). Therefore, the content of the educational activity is guided by what individuals need to know, as well as desire to know, in order to contribute productively in society. Progressivists believe in incorporating experimentation and projects into the learning activity; hence, the instructor serves to organize the learning activities, but the students actively engage in them. English as a Second Language and community development programs are examples of programs based upon the progressive philosophy (Elias & Merriam, 1980; Hamilton & Cunningham, 1989).

Fourth, the behaviorist approach to education seeks to change or alter behaviors in individuals (Elias & Merriam, 1980; Tyler, 1949). Such behavioral changes may be necessary in order to promote productivity. Changing behaviors is accomplished through determining needs, setting objectives, organizing the learning activities, evaluating the activities, and providing feedback to the learners. Therefore, the instructor organizes and provides learning activities that will elicit the desired behavioral changes. In this capacity, the learners assume an active role; they must actively participate in order for behaviors to be changed and reinforced. Examples of adult education activities that stem from the behaviorist model are competency-based education, computer assisted instruction, criterion-referenced instruction (Elias & Merriam, 1980), training and development programs (Watkins, 1989), and in-service programs (Edwards, 1986, 1987; Gurley, 1987).

Fifth, an approach that breaks away from intellectual development and productivity is the radical philosophy of education. Freire (1970), the major proponent of this philosophy, views education as a means to raise the consciousness of individuals in order to create social, political,

and economic changes in society. Raising consciousness is achieved by creating dialogue between the educator and the learners. Unlike the traditional banking concept approach to education, this approach encourages discussion among individuals concerning social problems and ways to counteract them. The educator and the learners collaborate on course material; this situation is viewed as a give and take relationship where the educator is open to change and also learns from the learners (Elias & Merriam, 1980).

In summary, these are the five most common philosophical approaches to adult education. Some educators may choose to adhere to one approach while others may take an eclectic approach. The eclectic approach helps to enrich the learning experience for both the educator and the learners. Different philosophies or a combination of philosophies may be incorporated into learning activities based upon the particular situation (i.e., what is the goal of the learning activity?). In addition, determining which philosophy or philosophies to incorporate may be facilitated by considering the characteristics of the adult learners. Understanding these characteristics, coupled with the situation, may aid the educator or instructor in determining which approach(es) is/are best for the particular continuing professional education activity.

Characteristics of Adult Learners.

As previously mentioned, the particular situation or desired learning outcome can affect the planning, implementation, and evaluation of educational activities. In addition, educators' views concerning adult learners impact how the activity is organized, delivered, and evaluated. There are distinct characteristics that adults exhibit which separate them from children. One of the biggest proponents of delineating the differences between adults and children is Malcolm Knowles. Knowles (1990), who coined the term andragogy (the art and science of teaching adults), bases this andragogical model on six assumptions concerning adult learners. Knowles views adult learners as: (a) needing to know, (b) possessing self-concept, (c) possessing experience, (d) ready to learn, (e) oriented towards learning, and (f) possessing motivation.

First, adults possess the need to know; they must know why they are engaging in an educational activity. Granted, continuing professional education is mandated for radiographers; however, it is important for the learners to view the educational activity as relevant. Participating in an educational activity merely for the sake of obtaining continuing professional education credits defeats the intended purpose; continuing professional education is designed to advance one's knowledge and skill levels. Therefore, radiographers must view the activity as relevant for more than just obtaining credit hours. Houle (1980) points out that obsession with quantity defeats the purpose of continuing professional education; instead, instructors must concern themselves with: the extent to which and how well the participants continue to apply the knowledge and skills as part of their practice; and, how readily and frequently the participants build upon what they have already learned. Hence, the implications are for the adult educator to explain the importance of the program and to stress that the knowledge gained is more important than the credit hours earned.

Second, adult educators must understand the importance of the learner's self-concept (Knowles, 1990). Self-concept refers to how one views himself, and as adults, individuals want to be viewed as capable of making their own decisions. Adults who possess the ability to make their own decisions are referred to as self-directed individuals (Brookfield, 1986; Kidd, 1973; Knowles, 1990). Making one's own decisions, however, does not necessarily equate to disregarding information from external sources (Brookfield, 1986). Brookfield notes that a difference exists between *autonomous* and *independent* decision-making; autonomy refers to the adult's ability to reach a decision based on consideration of all incoming information (including information from external sources). In this manner, the adult is seeking to make a prudent decision based on critical analysis and reflection of all the information available. Independence, on the other hand, equates to the adult making decisions without regards for any external information that could aid in making the decision. Therefore, functioning as a self-directed

individual does not equate to isolating one's self from all information and making decisions without regarding possible alternatives.

Although Brookfield (1986) believes that *information* from external sources should be considered when making decisions, he does oppose the imposition of external *goals* on individuals; he believes that adults do not function as fully self-directed individuals if goals are determined by external constituents. Like Knowles (1980; 1990), Brookfield proposes that goals be determined through collaboration and negotiation; this process, he believes, assists adults as seeing "themselves as proactive, initiating individuals engaged in a continuous re-creation of their personal relationships, work worlds, and social circumstances rather than as reactive individuals, buffeted by uncontrollable forces of circumstance" (p. 11). When one considers the area of continuing professional education, however, it is not unusual for goals or needs to be imposed. The typical overall goal of any hospital facility is to improve the quality and efficiency of its services. Brookfield acknowledges that this is often an issue with businesses and industries (including hospitals for the purpose of this research); needs are not typically negotiated due to concern over economics versus education. In other words, businesses and industries typically refrain from concerning themselves with developing the whole worker; they usually focus on economics – training workers to be productive and efficient.

The same basically holds true for hospitals. For example, the radiology department may need for a radiographer to learn a certain skill or procedure; even though the radiographer may not agree with this need, it must be met. Not meeting the need could jeopardize quality patient care and result in the radiographer losing his job. Brookfield (1986) notes that although economics tends to be the bottom line for corporate training programs (continuing professional education programs), adult educators should try to incorporate collaboration whenever possible. What adult educators must realize is that times exist when needs can be determined by: (a) the learners, (b) the educator, or (c) negotiation between the learners and the educator. Continuing professional education activities allow for needs determination by the learners or by negotiation

as long as the institution (hospital) lacks any specific or pressing need that must be met. Hence, radiographers are not considered as lacking in self-directedness simply because the opportunity to determine needs does not always exist. Certain skills and areas of knowledge must be imposed in order for radiography to continue delivering quality services.

In addition, another point that must be noted when referring to self-concept is that it should not always focus on needs determination. Just because it is inappropriate for the learners to negotiate their needs does not mean that they cannot have input concerning other aspects of the program. Adults may be encouraged to actively engage in determining the learning methodologies (Brookfield, 1986; Knowles, 1990; Merriam & Caffarella, 1991). For example, Grow (1991) notes that learners who exhibit some self-directedness may prefer seminars, group discussions, or group activities, as opposed to the traditional lecture method. Eliciting feelings concerning these alternative approaches helps the learners feel a part of the activity ("buying into" the program) resulting in the delivery of a more effective continuing professional education program. Adult educators may, however, need to present some ideas concerning various learning methodologies. Seaman and Fellenz (1989) provide a concise text on instructional strategies that incorporate varying levels of group interaction based upon the composition of the learners. Lectures, debates, simulations, and discussion groups are some of the examples that are presented in this text. Understanding the various methodologies available to the learners will aid in the collaboration process.

Third, adult educators must appreciate the learners' life experiences (Boissoneau, 1980; Brookfield, 1986; Knowles, 1990). Adults are a product of their experiences whether these experiences are favorable or unfavorable; when a continuing professional education activity is implemented, the adult educator should not ignore these experiences, but rather welcome this information into the program. According to Knowles (1990), ignoring one's experiences is devaluing to the individual. When an adult talks about his experiences, he should feel like an important contributor because others are learning from that information. Therefore, adult

educators should encourage radiographers to share their experiences when participating in continuing professional education programs; when everyone shares, knowledge is increased. Lastly, it must be mentioned that sharing information not only builds self-confidence and increases everyone's knowledge base, it is part of the Radiographers Code of Ethics. The Code of Ethics states that radiographers are expected to share knowledge with their colleagues (American Registry of Radiologic Technologists, 1999).

Fourth, adults possess a readiness to learn (Knowles, 1990). This readiness to learn is linked to the developmental stages/phases through which adults pass. In other words, situations arise in adulthood that necessitate the need for learning. Various studies exist that have documented reasons why learners participate in educational activities: Houle (1961); Johnstone and Rivera (1965); Morstain and Smart (1974); Scala (1996); and Shearon, Brownlee, and Johnson (1990). Johnstone and Riveria's study reveal eight reasons as to why adults participate in educational activities. Reasons for participation range from being a better informed citizen and increasing job skills to possessing information to perform tasks outside of work and to enjoying leisure time activities. Houle and Morstain and Smart also note similarities in reasons given for participation and are briefly discussed below.

Houle (1961) notes that adults possess three learning orientations: (a) *goal-oriented* – using education as a means to some other goal, (b) *activity-oriented* – using education for social interactions, and (c) *learning-oriented* – using education for the sake of learning (no goal exists other than to obtain knowledge for the sake of knowledge). Morstain and Smart (1974) expanded on Houle's study by creating three additional factors that relate to adult participation. Their six factors for participation are: (a) *social relationships* – to meet new people, (b) *external expectations* – to meet job expectations or to meet some form of credential (i.e., mandated continuing professional education), (c) *social welfare* – to become involved for the benefit of the community, (d) *professional advancement* – to achieve job advancements or to create job

enhancements, (e) *escape/stimulation* – to escape boredom, and (f) *cognitive interest* – to learn for the sake of learning.

Holding true to the research conducted 20 to 30 years ago, adults in the 1990s still cite similar reasons for participating in educational activities. Shearon, Brownlee, and Johnson's (1990) study of North Carolina Community College students reveals that curriculum students return to school to earn more money and to obtain better jobs while continuing education students return to learn things of interest as well as to earn more money. It must be noted that 61% of all curriculum students were 30 years of age and younger while 70% of continuing education students were 30 years of age and older. Twenty-five percent of all continuing education students were 60 and older.

Scala's (1996) research also reveals similar findings to that of Shearon, Brownlee, and Johnson's (1990) research. Although Scala's research focuses on adults over the age of 60, similar reasons for returning to educational activities are noted. Scala found that adults tend to participate in educational activities for the following reasons: enrichment; to fill a void after life changes; interest in specific courses; job training; always possessed the desire to attend college; to explore new options; and for mental stimulation. Basically speaking, these reasons coincide with the participation reasons revealed by the aforementioned studies.

Therefore, the implication for continuing professional education activities is this: even though continuing professional education for radiographers is mandated, the goal is to provide programs that will attempt to take into consideration all of the aforementioned reasons for participating. Adult educators must realize that not every learner is preoccupied with obtaining credits, even though this is probably a dominant reason why radiographers participate. Primary thrusts for radiographer participation can most likely be attributed to *goal-oriented* or *external expectation* reasons. Hence, the adult educator is challenged to overcome the "mandate" reason for participation by becoming creative in the design and implementation of the continuing

professional education programs. For example, group discussions may satisfy the need for social interaction as well as promote stimulation.

Fifth, adults tend to be problem-focused in their approach to education (Brookfield, 1986; Knowles, 1990; Pennington, Allan, & Green, 1984); they like to know how this information applies to everyday life. Note that this is not always the case; as previously mentioned, adults do participate simply for the social interactions and learning for the sake of learning. However, assuming that the learner is involved for reasons other than social interaction and learning for the sake of learning, they desire information that is applicable. Knox (1986) notes that if the content of the learning activity is deemed irrelevant, a barrier to learning may be constructed. Hence, the implication for adult educators is to link the material presented in the continuing professional education activity with everyday practice. By doing so, radiographers are more likely to appreciate the relevance of the information as well as exhibit a willingness to apply it.

Last, adult learners possess motivation (Knowles, 1990; Wlodkowski, 1985). Motivation is what drives individuals to accomplish some goal. More specifically, motivation results from those processes that "(a) arouse and instigate behavior, (b) give direction or purpose to behavior, (c) continue to allow behavior to persist, and (d) lead to choosing or preferring a particular behavior" (Wlodkowski, p. 2). Wlodkowski notes, however, that individuals may not always be motivated to *learn*. As a result, this poses a challenge for the adult educator who is planning a continuing professional education program. What must be noted, however, is that adult educators should not assume the entire responsibility for learner motivation – learners are responsible for their own motivation (Wlodkowski).

Although learners are responsible for their own motivation, adult educators are responsible for ascertaining that they exhibit certain characteristics and that they create a motivational learning environment. To begin with, Wlodkowski (1985) offers the following four characteristics of adult educators that helps promote learner motivation: *expertise*, *empathy*, *enthusiasm*, and *clarity*.

Expertise is knowledge; in order to share information, instructors must know their topics (Wlodkowski, 1985, pp. 17-22). The extent to which an instructor knows his topic depends in part on how much knowledge the learners possess (Knox, 1986, p. 41). For example, if the learners have little, if any, knowledge of the course then the instructor need not have a high level of content mastery. It must be pointed out, however, that knowing one's topic does not equate with effective instruction. Many of us have suffered through lectures given by brilliant professors, only to leave with feelings of disappointment.

Empathy is the ability to understand others. Basically, instructors need to "walk in their students' shoes". Unrealistic expectations, learning activities to which the students fail to relate, and failure to consider the learners' perspectives can result in a lack of participation and learning (Wlodkowski, 1985, pp. 22-28). Instructors should refrain from taking an "instructor versus learner" approach and attempt to establish a mutual relationship.

Instructors must also exhibit enthusiasm for the courses they teach (Knowles, 1980, p. 157; Wlodkowski, 1985, pp. 28-38). A lack of enthusiasm can have severe motivational effects on the learners; if instructors are not excited about their topics, how can they expect their students to exhibit any great interest? Instructors like these make students feel as if teaching them is a burden. Enthusiasm can exist in two forms, internal and external. For example, if an instructor is enthusiastic about the topic on the inside, this is internal. If the instructor becomes animated and emotional in displaying his enthusiasm, this is external. Students do not know how instructors feel; however, they can see how they act. Therefore, instructors must make a conscious effort to *act* enthusiastically. Enthusiasm is energy, and energy attracts (Wlodkowski, 1985, p. 31).

Lastly, instructors must exhibit clarity (Wlodkowski, 1985, pp. 38-43). Language must be on a level consistent with the learners. Concepts that have not been discussed and

understood should be avoided; "talking above one's head" is a frustrating experience for learners. In addition, instructors must ascertain that their material is presented in a logical and coherent fashion. Important concepts should be emphasized and learning should evolve from simplicity to complexity (Knox, 1986, pp. 124-125). In the event students do not initially comprehend the material instructors should provide other means for obtaining the information (i.e., maintain office hours) (Wlodkowski, 1985, p. 43).

These four [characteristics] provide the basis upon which instructors can focus and fine-tune their instructional skills. Conscientious instructors strive to exhibit characteristics that promote their topic and aid in participation and learning. Apathy can be detected by students, and results in feelings of frustration and disappointment. Instructors should take time, prior to each class meeting, and evaluate where they stand relative to their practice of expertise, empathy, enthusiasm, and clarity.

In addition to these skills, the environment must be conducive to learning. Instructors can possess the most outstanding instructional skills, but if the environment is not conducive, then participation and learning are hampered. Part of creating a conducive environment results from the instructor exhibiting the aforementioned skills. There are, however, some environmental factors relative to classroom design that must also be taken into account. For example, one must consider the physical setting of the classroom. Room size, furniture arrangements, seating positions, and aesthetic qualities should all be considered when creating the environment (Knowles, 1980, p. 223; Weinstein, 1981, p. 12). Weinstein notes that the last three factors are under the instructor's control. (Noble, 1996, pp. 8-11)

This writer, however, contends that the environmental factors are much harder to control when conducting distance education programs. In other words, the instructor has some, if not total, control over the environmental factors in his/her broadcasting location, but has little, if any, control over these factors for the distant sites. Should the distance education site (i.e., hospitals)

concern themselves with environmental factors, the instructor may offer the following suggestions:

To begin with, room size should be considered if at all possible (Knowles, 1980, p. 223). Room size should be compatible with the number of students in the class and with the type of seating arrangement the instructor desires. Room size also becomes an important factor depending upon the chosen instructional methodologies. For example, showing a video on a television set in a room that seats 300 students is probably not feasible unless the room is equipped with more than one television (preferably suspended from the ceilings). Weinstein (1981) offers some pertinent advice concerning the overall physical setting; she notes that no physical setting is ideal; rather, one must be chosen that most closely matches the objectives and teaching methods chosen by the instructor.

Second, furniture arrangements and seating arrangements must be considered (Knowles, 1980, p. 223; Weinstein, 1981, p. 12). Furniture arrangements and seating methods are based upon the instructional methodologies set forth by the instructor. Two types of settings are classified as sociopetal (circular arrangement) and sociofugal (linear arrangements) (Vosko, 1984, 1991). Sociopetal settings are implemented when the instructor desires group interactions. Students face one another, hence, encouraging participation from every student. Sociofugal settings, on the other hand, discourage students from communicating with one another. Attention is focused to the front of the classroom – towards the instructor.

Along these same lines is the concept of distances. Vosko (1984, 1991) views space as an important consideration in designing the physical arrangement. Individuals need personal space, a distance of about 6 inches to 4 feet around a person. Obviously, in a classroom setting, it is virtually impossible to have a 4-foot area of personal space. Therefore, instructors just need to use their judgment in making sure that students do not

feel crowded. Each student should have enough space for personal belongings and working.

Third, instructors should consider the aesthetics of the room (Knowles, 1980, p. 223; Weinstein, 1981, p. 12). Realistically, instructors rarely have control over this aspect. However, if the instructor does have some control over the setting, things such as carpeting, comfortable chairs, and soft room colors, may need to be chosen. Sommer and Olsen (1980) conducted an experiment to determine the effects of classroom environments on attitudes. Questionnaires completed by the students indicated that they were enthusiastic about the carpeting, comfortable seats, and decorative atmosphere.

In summary, instructors bear *some* responsibility in designing conducive learning environments (*"some"* is emphasized because instructors may not always have total control over the physical environment). Arrangements, space, and aesthetics all play a role in effecting [sic] participation and learning. Crowded, drab classrooms discourage participation and learning, while spacious and aesthetically pleasing ones help to foster the desire to be there. (Noble, 1996, pp. 11-13)

Summary

To summarize this section of the literature review, adult education provides a foundation upon which continuing professional education is acknowledged and understood. Understanding the dimensions of adult education assists the continuing professional educator in planning and implementing successful educational activities. As will be noted in the next section, continuing professional education varies from adult education in definition, but draws upon the research pertaining to the philosophies, assumptions, and characteristics of adult learners.

Continuing Professional Education

Before discussing the definition and purposes of continuing professional education, some clarification pertaining to the concept of a "profession" must be presented. What determines a

"profession" delineates continuing professional education from the adult and continuing education fields.

Determinants of a Profession.

When referring to Radiologic Technology, controversy exists as to whether or not the field is classified as a profession. Over the years, various approaches have been developed to classify occupations. Three approaches that have been used are the static approach, process approach, and the socio-economic approach. Following is a brief description of each approach as reported by Brower (1992, pp. 25-28):

> According to Cervero (1988), the static approach acquired its name due to its objective nature. Using objectives it is easy to delineate what occupations are and are not professions, thus, making it virtually impossible for occupations that are not professions to ever develop into one.
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> The first individual to devise an objective approach for defining professions was Abraham Flexner. In 1915, Flexner developed a list of objective criteria for professions containing six characteristics that he believed to be integral in defining a profession. Flexner (1915) believed that professions should (a) involve intelligence (ability to problem-solve), (b) have material that evolves from science, (c) be practical and have a definite purpose, (d) have a structured educational system, (e) tend to be self-organized, and (f) be altruistic.
>
> However, due to the inability of occupations to break through objective barriers and become recognized as professions, the static approach became increasingly unpopular. The second approach to defining a profession came about in the late 1950's when Greenwood (1957) introduced the process approach of classifying professions. According to Cervero (1988), the process approach eliminates the objective criteria so that no clear-cut distinctions can be made between professions and occupations because becoming a profession is a process.

As Greenwood (1957) believes, the difference between professionals and non-professionals is quantitative, not qualitative, meaning that all occupations have certain characteristics but in varying degrees. The characteristics which he attributes to professions are that they have (a) a body of theory which guides their practice, (b) professional authority, (c) sanctions of the community (i.e. control over who can rightfully be called a professional), (d) regulative codes of ethics, and (e) professional cultures.

Like Greenwood (1957), Millerson (1964) views occupations as becoming professions through the process approach. The six characteristics which Millerson (1964) believes denote a profession are (a) possessing a theoretical foundation, (b) having an occupational status level, (c) having professional status which depends upon social and economic changes, (d) having or not having organization, (e) possession or non-possession of a code of ethics, and (f) recognition by the public as being a profession.

The process approach was criticized by Freidson (1986) as failing "... to define the end state of professionalism toward which an occupation may be moving. Without some definition of *profession* the concept of professionalization is virtually meaningless..." (p. 31). As a result, the socio-economic approach became the way by which occupations were classified as professions.

The major proponents of the socio-economic approach, Freidson (1986) and Larson (1977) note that this approach has its roots in United States and English history. Socially, the way in which occupations become professions is through vested interest by the general public (Freidson, 1986). Ways in which the general public accepts occupations as professions are according to professional credentials and what services and products are of importance in society at a particular time.

Economically, professions emerged as a result of market control during the nineteenth century, and becoming recognized as a profession helped to protect an

occupation from competition in the labor market (Larson, 1977). Larson (1977) states that "the structure of a particular professional market is determined by the broader social structure which shapes the social need for a given service and therefore defines the actual or potential publics of a given profession" (p. 18).

Freidson (1986) notes, that, currently, one method of determining which occupations should be classified as professions is according to the categories formulated by the federal Bureau of the Census. The categories which are used to determine occupational status are (a) Managerial and professional specialty, (b) Technical, sales, and administrative support, (c) Service occupations, (d) Precision production, craft, and repair, (e) Operators, fabricators, and laborers, (f) Farming, forestry, and fishing (Green & Epstein, 1991). Therefore, when a census of the United States population is conducted and individuals are categorized according to occupations, these are the categories that are utilized.

Every occupation desires its own identity – its own body of knowledge, professional credentials, and prestige (to be classified as a profession). From the previous discussion, it can be surmised that there are no clear cut rules as to who is and who is not a profession, and no one knows for sure when the controversy will abate. Regardless of the controversy, however, this researcher views the Radiologic Technology field as a profession, and, in turn, views radiographers as health care professionals. This assumption is based on the following: Radiologic Technology has a distinct body of knowledge; radiographers complete a formal education program; continuing education has been mandated for the field; and, the field is self-regulated with an existing code of ethics.

One point that must be elaborated a little further is the mandating of continuing professional education for radiographers. Mandated continuing professional education for radiographers emphasizes the importance of the radiographers' role in the health care delivery system; it identifies radiographers as a valuable group in this system and in society. Being valued

is, in part, a result of a profession's *expertise*. Cervero (1989) refers to this as the *functionalist viewpoint* of continuing professional education. This viewpoint contends that every profession has a body of knowledge indigenous to its practice and that maintaining this body of knowledge results in expertise. In turn, this expertise allows professions to be viewed by society as functional and integral components necessary for the society's well being. Therefore, in summary, radiographers are professionals who, through the aid of continuing professional education, strive to maintain an acceptable level of knowledge and skills for the sustenance of quality patient care and self-growth, thus aiding in society's well-being.

Definition, Purpose, and Distinguishing Characteristics.

As previously mentioned, "adult education" consists of various definitions; the lack of agreement on these definitions results from the disagreement over what constitutes an adult education activity. Likewise, continuing professional education has fallen asunder to the definition game. Continuing professional education is oftentimes equated to lifelong learning or continuing education. However, given the previous discussion pertaining to "professions", it is clear that continuing professional education requires and deserves its own definition.

Basically speaking, continuing professional education can be defined as meeting the educational needs of professionals (Azzaretto, 1987). In order to better appreciate this concept, "continuing education" must be defined. According to Boissoneau (1980), continuing education is education beyond a culmination point; typically this point is that of traditional education or high school. Likewise, Green (1985) states that continuing education is what occurs after one has received a certificate or degree. Therefore, what is apparent is that continuing education takes place beyond some point – whether this point is beyond high school or college. When dealing with professionals, however, the definition associated with education beyond some point is referred to as *continuing professional education*. The importance of this distinction is noted below.

The definition of continuing professional education is one distinguishing factor between it and adult and continuing education. Another factor that serves to separate continuing professional education from other educational activities is related to its purposes, goals, and objectives. Like other adult education fields, continuing professional education lacks agreement pertaining to the purposes programs should serve (Scanlan, 1985). Basically speaking, though, continuing professional education serves to advance skills and knowledge as well as foster growth within the professional domain for the purpose of providing quality health care services.

First, continuing professional education serves to advance professionals' skills and knowledge bases (Azzaretto, 1987; Barriball, While, & Norman, 1992; Broski & Upp, 1979; Cervero, 1989; Ferguson, 1994; Gurley, 1987; Price, 1987; Scanlan, 1985). Technology is ever changing in radiography, and, as a result, hospitals, as well as professional associations, develop programs to ensure that radiographers remain current in the field and deliver quality patient services. Therefore, programs intended to serve this function typically focus on needs deficiency; in other words, programs are designed that enable the radiographer to either "brush up" on or increase knowledge in specific areas. For example, radiographers may need to learn how to operate newly installed x-ray equipment or how to perform new radiographic procedures.

On the other hand, some individuals view continuing professional education as a means of fostering growth (Barriball, While, & Norman, 1992; Edwards, 1983; Edwards, 1986; Edwards, 1987; Scanlan, 1985). According to Edwards (1983), "programs must be responsive not only in the context of new technologies or problem areas, but also in terms of the personal professional development of the technologist" (p. 213). This focus results in programs designed to meet learners' interests, but it must be explained and understood within the context of continuing education for professionals. Fostering growth by no means correlates to a "free-for-all" whereby radiographers participate in activities that are totally non-related to their jobs. For example, adult and continuing education programs may focus on leisure time activities (i.e., sewing, gardening, auto repair) to promote personal growth. When dealing with continuing

professional education, however, fostering growth is relative to the professional domain in which one works (Barriball, While, & Norman). In other words, continuing professional education activities that are designed to foster growth must focus on work-related issues (i.e., conflict resolution, management theories, self-confidence, self-esteem, motivation, critical thinking).

Regardless of which focus a particular program follows, principles of adult learning may be applied. Galbraith and Simon-Galbraith (1984) espouse the importance of incorporating, when feasible, andragogical techniques in Radiologic Technology programs. These principles, as discussed earlier in this chapter, may also be applied to on-campus and off-campus programs as well as to distance education programs. Radiographers are adults, and whether the goal is to update skills or to foster growth, the educator must be mindful of adult characteristics and ensure that every attempt is made to respect the adult learner. Even if the program's focus is on updating skills, the radiographer's input into program planning may result not only in attaining the desired skill, but in promoting self-confidence or self-esteem (growth concepts). Hence, programs may achieve both foci (skills and growth) simply by providing radiographers with the opportunity to participate in the various phases of program development.

As mentioned in Chapter 1, continuing professional education for radiographers was mandated beginning January 1, 1995. Some guidelines exist to determine the parameters for what may or may not be considered a valid continuing professional education program. The American Registry of Radiologic Technologists (1997) offers the following definition as to what constitutes a continuing professional education activity:

> a learning activity that is planned, organized, and administered to enhance the professional knowledge and skills underlying professional performance that a technologist uses to provide services for patients, the public or the medical profession. In order to qualify as continuing education, the activity must be planned, organized and provide sufficient depth and scope of a subject area. (p. 14)

This definition is broad enough to include programs designed to enhance skills necessary to perform professional duties as well programs designed to foster growth (K. Joy, personal communication, April 17, 1997). If fostering growth is the goal, however, program design must center around the professional domain of Radiologic Technology (as previously discussed). Therefore, educators may offer programs that focus on skill improvement or they may design activities that develop or promote, for example, motivation, self-esteem, self-confidence, and stress management.

In addition to the definition and purposes of continuing professional education, Grotelueschen (1985) identifies three other factors that set this domain apart from adult and continuing education. First, the characteristics of continuing professional education participants vary from those who participate in adult and continuing education programs. It is noted that professionals tend to be more homogeneous than the adult population in general and comprise a higher level of formal education. Second, participation by professionals is oftentimes mandated; therefore, adult educators face the challenge of providing the best programs possible (as discussed in the previous section). Third, the beneficiaries of continuing professional education are different. When a professional participates in an educational activity, two goals may be achieved; the professional grows for self-enhancement or grows in skills and knowledge. Expanding one's skills and knowledge is viewed as having a direct benefit for the patients or clients. In continuing education in general, there may be no clients who are intended to receive the direct benefits (other than the learner).

In summary, continuing professional education does vary somewhat from adult and continuing education in both definition and purposes. The philosophical viewpoints concerning adult education, however, including their underlying assumptions, are applicable to continuing professional education. Likewise, the characteristics of adult learners are also applicable when planning continuing professional education programs. Grotelueschen (1985) notes that, due to the characteristics of continuing professional education participants, continuing education theory may

be inappropriate for the professional field. However, until continuing professional education develops a single framework, including assumptions and principles, the adult education literature will serve as a guide for practice.

The Community College's Role in Continuing Professional Education.

The community college system is challenged with meeting a diverse range of missions. As early as the 1920s, community colleges set themselves apart from the traditional colleges and universities by broadening their scope and functions. According to Fields (1962) and Shearon and Tollefson (1989), the original purpose of the junior college (later called the community college) was to provide the first two years of a university education (transfer courses). By the 1920s, however, California broke this pattern by introducing what was known as the dual-purpose junior college. What resulted was not only a focus on transfer courses, but concern over meeting needs specific to the community. This mission has been maintained through today; the community college system is viewed as being all things to all people, including community involvement.

The specific types of programs and services that are offered to the public obviously vary from community college to community college. However, broadly speaking, community colleges generally devote themselves to the following functions: (a) *formal education* – college transfer, general studies, vocational, technical, and remedial-developmental; (b) *student services* – counseling, testing, and financial aid; (c) *continuing education* – job related and recreational; (d) *community services* – concerts, plays, and lectures; and (e) *economic development* – college and business collaborations (Shearon & Tollefson, 1989).

Community colleges have committed themselves to serving the public through continuing education departments. When one defines "public" it relates to anyone within the community college service area. Therefore, community college continuing education departments focus their energies on meeting the needs of any individual or group of individuals within a specified area. Inclusion of radiographers within this group is no exception; community colleges that agree to

devote and involve themselves in the community assume the responsibility of excluding no one who seeks further education.

Faculty Members and Continuing Professional Education.

The average number of faculty members for a Radiologic Technology program is three to four. Most faculty members would probably describe their course load as full-time (approximately 18-20 contact hours per week). Aside from planning and conducting classes, faculty are also typically involved in advising students, administrative program duties, and committee obligations to the college. Therefore, asking faculty members to routinely involve themselves with continuing professional education activities for area hospitals may require some additional form of compensation from the community college. Fischer (1987) notes that institutions involved in contracting (providing services to businesses and industries) must provide some type of incentive to encourage faculty to work with the institution in providing continuing professional education activities. Faculty members who desire extra compensation but are not receiving it from the college may decide to independently offer continuing professional education programs. The type of compensation chosen depends upon the community college, but may include, for example, reduced course loads, monetary reimbursements, time off, or extra vacation days.

Factors Affecting Adult Attitudes Towards Continuing Education.

Darkenwald and Hayes (1986) constructed a 22-item Likert-type survey instrument to elicit attitudes towards continuing education; five additional items were presented in a yes/no format. In addition, five demographic questions were posed dealing with the respondents' sex, age, educational attainment, income, and race. The survey has an alpha reliability coefficient of .90. Content validity is supported by a panel of 11 doctoral students and faculty members in adult education.

The survey was completed by 275 adults in the central New Jersey area. Using one-way analysis of variance, attitudes towards continuing education were analyzed according to sex,

education, income, age, and race. Significant relationships existed between attitudes and sex ($p<.001$), level of educational attainment ($p<.001$), and income ($p<.05$). No significant correlations were found between attitudes and age or race.

It must be noted that even though this research study, as well as the following study, pertains to continuing education, the results are applicable to this writer's research dealing with continuing professional education.

Using the survey developed by Darkenwald and Hayes (1986), Fung (1994) researched the relationship between demographic characteristics and education attitudes. It must be noted that Fung implemented three additional surveys in the research because the overall goal of the study was to examine the relationships between education-related fears, anxiety, self-esteem, and education attitudes. For the purpose of this writer's research, however, only the results relative to education attitudes are presented.

Fung (1994) surveyed 616 Kansas State University students who were 35 to 45 years of age, single, married, or single parenting. The total responding sample was 406. Fung incorporated more demographic characteristics into the research than did Darkenwald and Hayes (1986) (i.e., levels of participation in education, high school graduating class size, academic major, employment, marital status, and degree versus non-degree seeking). Fung noted that a significant relationship exists for attitudes towards education and levels of participation in education ($p<.05$). No significant relationships were found for any of the other variables with regards to educational attitudes.

Following the characteristics that Darkenwald and Hayes (1986) investigated, Fung (1994) noted the following results. First, using one-way analysis of variance, no significant differences were discovered between attitudes and income or educational attainment (years of higher education). Second, using t-tests, no significant differences were noted between attitudes and gender. Lastly, Fung noted that one-way analysis of variance revealed significant differences between attitudes and age ($p<.01$). Older respondents possess more positive attitudes towards

education than do younger respondents. No analysis was performed on race due to 80% of the respondents classifying themselves as Caucasian.

Although Darkenwald and Hayes (1986) and Fung (1994) discovered opposing research results, awareness of some of the potential factors that can affect participants attitudes towards educational activities may assist the instructor in planning meaningful and effective programs.

Summary

In summary continuing professional education is growing in its importance and relevance to professional practice. Radiologic Technology is no exception to this trend; now, more than ever, institutions are seeking ways to increase and maintain the skills and knowledge of their radiographers. Community colleges may step up and become integrated with area hospitals in order to provide the continuing professional education that is needed by radiographers. Consideration, however, must be given to faculty members who participate in the offering of continuing professional education programs for radiographers. Reduced course loads, monetary reimbursements, time off, or extra vacation days may serve as compensation for willingness to provide services to the community.

Granted continuing professional education for radiographers is mandated; however, awareness of potential factors that can affect continuing professional education participation may assist instructors in planning quality programs. Therefore, instructors may strive to create programs that not only provide credits, but provide programs that are stimulating for the radiographers. For example, if age is deemed to be a significant factor relative to whether or not one participates in a program (remember that program participation is not the only means by which radiographers receive continuing professional education credit), the instructor may try to gear some program information towards particular age groups.

Distance Education

Education at a distance is not a new educational concept; as early as the 1700's individuals participated in what was known as correspondence courses (MacBrayne, 1995).

Correspondence courses, such as the first documented course in Boston in 1728 and those provided by the Chautauqua movement in 1874, served to promote accessibility to individuals desiring an education (Knowles, 1960; MacBrayne, 1995). The early media for such courses was printed materials that were delivered via the postal system (Lever-Duffy, 1991). Since the 1800's the concept of distance education has not changed; what has changed, however, are the means by which learning takes place. This section focuses on (a) the definition and benefits of distance education, (b) faculty member considerations and attitudes, and (c) the concept of instructional technology, including faculty attitudes.

Definition and Benefits of Distance Education.

What would a field of study be like without some type of semantic debate? Reviewing the literature pertaining to distance education reveals that disagreement revolves around the terms "distance education" and "distance learning." Whatever term an individual chooses to use depends upon one's view concerning the definitions of "education" and "learning." This terminology debate is out of the scope of this research; however, to guide this study, the term "distance education" is used. Distance education is chosen because of its implication towards a lifelong process of inquiry (Knowles, 1980). In other words, educational programs provide individuals with the opportunity to engage in lifelong learning, but they do not guarantee that learning has taken place. According to Knowles, learning takes place from within the individual – when the individual is motivated to learn in order to meet some goal. As a result, learning produces behavioral changes in an individual, or at least, the potential to change (Merriam & Caffarella, 1991). Therefore, it can be argued that distance education is an acceptable term when referring to continuing professional education for radiographers. Community colleges and area hospitals may join together to offer educational programs, but they cannot guarantee that the radiographers are learning; some radiographers may simply participate in the programs to meet credential requirements.

Given that this research follows the term distance education, the review now turns to a brief discussion of its definition and benefits. As with adult education, distance education, too, has various definitions. When all of the definitions are considered, however, one basic element is obvious; distance education comprises educational programs that are offered at a distance from the instructor (Rumble, 1986; Tanenbaum, Rogers, Cross, & Tilson, 1996). In addition to the fact that distance education results in the physical separation of instructor and participants, there are two additional features that characterize the nature of distance education. According to Garrison (1989), distance education involves communication and some form of media (i.e. technology) to facilitate the learning process.

These types of educational programs can prove beneficial to the learners due to the alleviation of two main participation barriers – location and time (Garrison, 1987). For health care professionals, such as radiographers, distance education programs provide a convenient location to learn new skills as well as obtain continuing professional education credit. Typically, when traveling is involved, only a very small number of technologists may participate; radiology departments oftentimes operate twenty-four hours a day, and, therefore, limit the number of technologists that may leave work to attend off-site conferences. In addition, the distance education programs may be offered at times when the patient load is slow at the hospital, or the programs may be videotaped to be watched at a later time. Therefore, radiographers are not necessarily confined to conference times; distance education programs may be planned taking into account convenient times for the technologists as well as the radiology department.

Faculty Members and Distance Education.

Without faculty support, community colleges cannot expect distance education to be successful. A barrier to the effective delivery of distance education programs may be attributed to faculty attitudes concerning the technology. Faculty members may resist this new technology due to uncertainty and unfamiliarity (Knapper, 1982b). Randall, Bishop, Johnson, Shearin, Godley, and Caudle (1996) conducted a statewide survey in North Carolina to document the perceptions

and opinions of North Carolina community college personnel concerning distance education. Specifically, this study targeted top administrators (presidents, instructional administrators, business administrators, learning resource center directors, and corporate and continuing education administrators), middle management (deans, department heads, directors, and department chairs), support staff (computer technicians, planners, media and communication specialists, librarians, and system administrators), and distance education faculty (any instructor involved in delivering distance education courses). The results revealed that, as of the fall of 1994, a wide range of knowledge, training, access, and the use of distance technology exists between the professionals. Survey responses were grouped into seven areas including: (a) access to technology, (b) training in technology, (c) information and communication regarding technology, (d) leadership and decision making, (e) innovation, (f) barriers and obstacles, and (g) Full Time Equivalence.

Following are the results as reported by Randall et al. (1996). Opinions and perceptions regarding *access* to technology revealed that these professionals believe in technology access for a broad base of faculty, but that it is not always convenient. Likewise, respondents indicated that *training* with the various forms of technology is necessary as well as resources for technology *information*. Respondents also noted that the state, as well as the community college, should take an active *leadership* role and that technical support be provided. It was also indicated that *innovation* to implement technology was not widely encouraged; in addition, a lack of funding, equipment, and training were cited as *barriers* to technology implementation. Lastly, the professionals indicated that the existing funding structure (*Full Time Equivalence*) does not support distance education technology, and that faculty members involved in distance education should be compensated in some manner (i.e., extra pay, reduced teaching load).

Like Randall et al., Clark (1992) reported on the barriers of implementing distance education. Clark's research identified the following barriers: workload or resource concerns, distrust of administrators, lack of administrative support, and a lack of adequate funding.

Further investigation into the literature revealed some of the same results reported by the aforementioned studies. Two of the main points stressed in the literature were adequate training and faculty compensation. First, in order to alleviate some of the apprehensions and reservations surrounding the delivery of distance education programs, adequate faculty training must be provided (Glenn & Carrier, 1989; Herring, Smaldino, & Thompson, 1995; Gooler, 1989; Sturdivant, 1989; Swalec, 1993). Community colleges may train faculty via their instructional technology expert. Training may include equipment usage and practice sessions to assist faculty in becoming familiar with and comfortable with the technology. It must be noted that training is on going; technology rapidly changes and, if the community college updates and implements new technology, faculty must be kept up-to-date. In addition, faculty members must have access to the technology expert when questions or concerns arise.

Second, as with continuing professional education, some form of compensation should be provided to faculty who participate in distance education. Although not specifically directed towards distance education, one example of rewarding instructors for participating in technology training is taking place in the Houston Independent School District (Sturdivant, 1989). Instructors who participate in training and subsequently share their knowledge with other instructors earn a $2,000 annual salary stipend (this offer is limited to one instructor per campus). Instructors who at least participate in training, but are not serving as trainers for other instructors, earn career ladder credit that increases their salary. Another example of faculty compensation exists at Waubonsee Community College in Illinois (Swalec, 1993). Although the exact form of compensation is not discussed, at least the administrators recognize the extra time and effort required on behalf of the instructors to participate in distance education activities.

One last point to note is that since this research advocates distance education for radiographers, principles of adult learning should not be overlooked in the delivery of the educational programs. Integrated facilities will hopefully turn out to be a long lasting partnership between the community college and area hospitals. Therefore, instructors may conduct needs

analysis and implement some adult learning principles not routinely implemented at typical continuing professional education conferences and workshops. In other words, continuing professional education through distance education may be viewed as being more of a class rather than a workshop when integrated facilities exist.

Faculty Attitudes Towards Distance Education.

Stinehart (1987) and Clark (1992) both focused their research on faculty attitudes towards distance education. To begin with, Stinehart (1987) constructed a 52-item survey to elicit Likert-type responses and administered it to 139 Iowa State University faculty members. One hundred five surveys were usable; these respondents were, for portions of the analyses, divided into two groups – those experienced with distance education (n=53) and those with no distance education experience (n=52). Survey validity was established in three ways. First, construct validity was determined through information drawn from data gathered in the distance education literature. Second, the survey was piloted on four faculty members (two experienced, two non-experienced). Lastly, Pearson correlation coefficients were calculated for each question. A correlation coefficient of .50 or above was considered to be sufficient. Reliability was established using the Cronbach alpha coefficient; an alpha level of .60 was considered to be acceptable.

In general the research revealed that a majority (61%) of the total sample (N=105) are willing to teach at a distance. Of this 61%, however, the majority (76%) were faculty who were already experienced with distance education. Group A (experienced faculty) possessed more positive viewpoints concerning the use of technology for instruction. Therefore, for group A, perceptions regarding the use of technology for instruction significantly ($p<.05$) affected willingness to teach at a distance. As for group B (inexperienced faculty), use of technology was not a significant factor related to one's willingness to engage in distance education.

Lastly, a comparison of means was made to determine what factors are held as very positive (5.0) to very negative (1.0) concerning particular aspects of distance education. For the total sample the following results indicate, from most positive to most negative, viewpoints

towards distance education: staff services (4.002), control over the teaching-learning process (3.274), the use of technology (3.210), logistics (2.986), quality of distance teaching (2.929), administrative support (2.872), and awareness of the distance education field (2.176).

Clark (1992) developed a Likert-type and open-ended question survey containing questions to elicit demographic information as well as attitudes towards distance education. The survey population consisted of 189 faculty members from 21 public research universities, 177 faculty from 20 public comprehensive universities, and 136 faculty from 16 public two-year colleges.

Questions focused on general attitudes towards distance education as well as on attitudes concerning the use of distance education in their particular program area and personal use of distance education in their programs. The results indicated that respondents held slightly positive attitudes (M=3.77 where 1=very positive and 7=very negative) towards distance education as a general concept. Respondents, however, possessed slightly to moderately negative attitudes (M=4.36) towards using distance education in their own programs and towards personal use of distance education in their programs (M=4.47). Therefore, respondents were not likely to consider the adoption of distance education methods. About one in five faculty indicated very positive attitudes towards personal participation in distance education. In addition, about four in ten faculty who held very positive attitudes towards personal participation in distance education worked at two-year colleges. This was deemed to be significant since about one in four faculty overall taught at the two-year level.

When attitudes towards various media were considered, video (i.e., video conferencing and telecourses) was favored over audiographics, computer conferencing, correspondence studies, and audioconferencing. In other words, visual media was preferred over the other types of media. Overall, however, respondents reported slightly to moderately negative attitudes (M=4.29 where 1=very positive and 7=very negative) towards distance education media.

When demographic factors were addressed for all faculty, the results indicated that attitudes towards distance education as a general concept was not associated with age, gender, or years in one's current position. Women at two-year colleges, however, were significantly ($p<.05$) more positive in their attitudes towards distance education as a general concept than were their male counterparts.

Lastly, two-year college faculty, as well as faculty at comprehensive universities (four-year), reported significantly ($p<.05$) more familiarity with the term distance education than faculty at research universities (four-year). Department chairs at all three types of institutions, however, were more likely to be familiar with the term distance education than were other faculty members. At the two-year college, though, there was a significant ($p<.05$) difference between department chairs and non-chairs regarding familiarity with the distance education term. In addition, two-year college faculty were more likely to report using media in the classroom or implementing distance education methods than four-year faculty (significant at $p<.05$). Department chairs at two-year colleges were, however, more likely to report previous use of distance education than were other two-year college faculty members (significant at $p<.05$).

Instructional Technology in Distance Education: Creating Equal Programs

Unlike the early forms of distance education which relied primarily on print media for communication, distance education today focuses on using technology to conduct the programs. As surprising as it may seem, Doucette (1993) notes that community colleges are leaders in the application of this technology for teaching and learning. A variety of technology exists to facilitate the teaching - learning process including e-mail, internet, audio, television, and computers. It must be noted that an in-depth discussion pertaining to the equipment required for this undertaking is out of the scope of this research. Planning and constructing distance education programs must entail the expertise of a technology specialist. This researcher acknowledges that these varied forms of media are valuable distance education tools, and will, subsequently, be addressed in the survey. One particular area of interest, however, is that of two-way audio and

video distance education. This form of distance education better emulates on-site educational programs as evidenced by the literature.

According to Simonson (1995), distant education programs should be made equivalent to programs offered locally or on campus. The objective is to create learning experiences that result in similar learner outcomes when local and distant programs are compared. When continuing professional education is considered, one must realize that the objective is not merely to obtain credit, but to learn and apply the material that is presented. Therefore, these educational programs should be treated as if the participants were attending an on-campus program. Some examples of two-way interactive distance education programs include: (a) the Iowa Communications Network (Simonson & Schlosser, 1995), (b) the Utah State University's Life Span Education Program (Stewart, 1995), (c) the seven University of Maine campuses (Baird & Monson, 1992), (d) Paducah Community College in Kentucky (O'Hara & Patton, 1992), and (e) North Carolina Community College System (North Carolina Department of Community Colleges, 1997). Through this type of distance education program, participants at remote locations are able to hear as well as see the instructor or presenter.

When one considers continuing professional education for radiographers, two-way interactive video and audio can prove to be a successful learning tool. As previously discussed, one goal of integrated facilities is to establish a long time relationship between the community college and area hospitals. As a result, instructors from the community college will, over time, form a relationship with the radiographers in the hospital. Two-way audio, of course, is necessary to establish a relationship and ensure that the participants are learning; the two-way audio system allows the participants to interact with the instructor by asking questions or clarifying material that is presented. Two-way video can also help enhance this relationship because the instructor will be able to see who is participating in the educational programs, thus creating a learning situation more comparable to that of being on location. As opposed to one-way video, which allows the participants to view the instructor, two-way video narrows the "distance" gap in

distance education. An example of the effectiveness of two-way interactive video and audio programs is documented by the United States military. The military conducted distance education classes via this modality and found that soldiers learned faster and retained more information than courses taught on-site or through one-way video programs (Darago, 1993). Additionally, Paducah Community College notes that their participants performed just as well as, or better, than those on location (O'Hara & Patton, 1992).

One-way video, audio tapes, video tapes, computer programs, and other instructional technologies all provide viable and valuable means for obtaining continuing professional education credits. This brief discussion pertaining to two-way audio and video, however, was presented because of the additional benefits it can provide for radiographers.

Faculty Knowledge and Use of Instructional Technologies.

The previous section focused on how distance education programs can be made equivalent to on-site programs while this section focuses on faculty knowledge and use of various instructional technologies. Specifically, the following study revealed faculty knowledge and experience with instructional technologies, use of technology in teaching, the importance of and future use of technology in teaching, and the impact of faculty characteristics.

Spotts and Bowman (1995) investigated faculty knowledge and experience concerning instructional technology at a mid-western public university. Surveying the faculty was accomplished with a questionnaire that yielded 306 usable surveys.

The results indicated that most faculty members possess good to expert knowledge of audio, film, video, and word processing. Fewer faculty had good to expert knowledge of computer-based instructional technologies such as spreadsheets, statistical computing, e-mail and computer-assisted instruction; even fewer faculty possessed good to expert knowledge of the newer instructional technologies including presentation software, computer conferencing, multimedia, and distance learning. Experience with the various forms of instructional technologies followed the same pattern as the knowledge.

Faculty reported that the most frequently used instructional technology in teaching was word processing. The least implemented technologies included distance learning, computer conferencing, multimedia, presentation software, computer-assisted instruction, e-mail, and statistical computing. With the exception of word processing, fewer than 20% of the faculty indicated using any type of instructional technology on a regular basis.

Despite the results indicating that instructional technologies are not widely implemented in teaching (with the exception of word processing), 65% of the faculty indicated that instructional technology is important to critically important to their teaching. While a majority of the faculty indicated that instructional technology is important to teaching, less than half (42%) reported that it was moderately to highly likely they would implement a new instructional technology media in their class that year. Thirty-two percent responded that it was somewhat likely while 26% indicated that implementation was not likely.

Lastly, the results focused on faculty characteristics and their impact on the various forms of instructional technologies. For these results, instructional technologies were divided into three groups – old technologies (audio, film, video), new technologies (multimedia, distance learning, computer-assisted instruction, e-mail, computer conferencing, presentation software), and tool technologies (word processing, spreadsheets, statistical computing). The results revealed that for gender, no significant differences were found regarding knowledge of older technologies or tool technologies. As for new technologies, however, a significant difference was found with more males reporting a higher level of knowledge. As for experience, a significant difference was found between males and females with regards to older technologies; females reported more experience with these technologies. Significant differences were also found with regards to experience with newer technologies; males reported more experience with these technologies. Lastly, no significant differences were found when tool technologies were considered.

Implementing the 86 item survey developed by Spotts and Bowman (1995), Heath (1996) conducted a study to determine university faculty attitudes towards distance education and the use

of instructional technologies. The population for this research consisted of 140 faculty members from Sonoma State University in California (107 surveys were returned and 103 surveys were usable). The survey instrument was tested for validity and reliability due to the fact that it had not been previously tested. Validity was determined by a panel of experts while reliability was established by using the Cronbach alpha reliability coefficient; alpha coefficients were found to be .84 and above.

To begin with faculty were assessed based on their knowledge of various instructional technologies (the scale was 1 to 5 where 1 = no knowledge and 5 = a great deal of knowledge). The list of instructional technologies included: audio, film, video, multimedia, distance education, computer-assisted instruction, electronic mail, computer conferencing, word processing, spreadsheets, internet, presentation software, and statistical computing. The average for all instructional technologies was 2.78 with faculty reporting the most knowledge about word processing (M=3.94) and the least knowledge about distance education (M=1.85). In addition, faculty reported knowledge of older technologies (i.e., word processing, audio, video, and film). Less knowledge of newer technologies was reported (i.e., multimedia, statistical computing, presentation software, distance education).

When age, gender, and the number of years in higher education were considered, the results revealed that individuals between the ages of 25 - 35 yielded the highest knowledge (M=3.44) concerning instructional technologies. It was also noted that as age increased instructional technology knowledge decreased. As for gender, females (M=2.86) revealed more knowledge than did males (M=2.73). Lastly, individuals with the least amount of experience in higher education (10 years or less) revealed the greatest amount of instructional technology knowledge (M=3.11). As with age, as the number of years in higher education increased, the amount of instructional technology knowledge decreased.

Faculty were also surveyed to determine their level of experience with the various instructional technologies. The scale ranged from 1 (never) to 3 (50% or more of the semester)

with 1.71 being the average use. Faculty most frequently implemented word processing (M=2.83) and least frequently implemented distance education (M=1.04). Overall, the respondents indicated that they most frequently implemented "older" technologies versus "newer" technologies. Kendall's Tau revealed that a positive association (.58, $p<.01$) existed between knowledge and experience; hence, faculty possessed the most knowledge with those instructional technologies that they most frequently used.

When age, gender, and the number of years in higher education were considered, the results revealed that individuals between the ages of 25 - 35 yielded the highest experience (M=1.90) with instructional technologies. It was also noted that as age increased experience with instructional technology decreased. As for gender, females (M=1.77) revealed more experience than did males (M=1.68). Lastly, individuals with the least amount of experience in higher education (10 years or less) revealed the greatest amount of experience with instructional technology (M=1.85). As with age, as the number of years in higher education increased, the amount of experience with instructional technology decreased.

Heath (1996) also asked respondents about the overall importance of instructional technology to their teaching as well as their likelihood of implementing a new instructional technology within the next year. Six percent rated the importance of instructional technology as critically important, 29% as very important, 20% as important, 35% as somewhat important, and 10% as not important. As for implementation, 13% rated it as highly likely, 25% as very likely, 16% as moderately likely, 26% as somewhat likely, and 19% as not likely.

Respondents were also asked about 1) factors influencing the use of instructional technology, 2) incentives to use instructional technologies, and 3) barriers against the use of instructional technology. The most important influencing factors were equipment availability and funding for materials; the least important factor was the frequency of use by colleagues. The most important incentive was assigned time and student/technical assistance; the least important factor was national recognition. It must be noted that out of eight incentives, promotions and monetary

rewards ranked 5th , 6th , and 7th. Lastly, the most significant barrier to implementing instructional technology was lack of time. Other barriers included (in descending order of importance) lack of technical support, lack of equipment, lack of administrative support, lack of relevance to the discipline, lack of interest in technology, and a lack of contribution to advancement.

Heath's (1996) second research question focused on the relationship between the knowledge and use of instructional technology and attitudes towards distance education. Pearson's correlation coefficients (attitudes and knowledge -0.24, $p<.05$; attitudes and use -0.32, $p<.01$) indicated that a greater knowledge of instructional technology as well as higher levels of experience was associated with more favorable attitudes towards distance education.

Lastly, Heath's (1996) third research question focused on attitudes towards distance education and knowledge and use of instructional technology relative to faculty characteristics. This question was analyzed using one-way analysis of variance. This analysis was accomplished by dividing faculty members into groups within the characteristics of length of employment, age, and gender. As for attitudes towards distance education, no differences were attributed to length of employment, age, or gender.

When differences in faculty characteristics were examined relative to knowledge of and experience with instructional technologies, Heath noted the following results. A significant relationship existed between age and knowledge ($p<.01$). Tukey's post-hoc comparisons revealed that younger faculty (25-35 years old) possessed more knowledge than older faculty (>55 years old). There was also a significant relationship between length of employment and knowledge about instructional technologies ($p<.05$). Tukey's post-hoc comparisons indicated that faculty with less than 10 years experience had significantly higher knowledge than faculty with 28 or more years experience. Similar results were obtained for experience with instructional technologies. Experience with technology decreased with age ($p<.05$) and years of experience

($p<.05$). Lastly, there were no significant differences between genders in either knowledge of or experience with instructional technologies.

Summary

Distance education provides an alternative delivery method for radiographers to update skills and knowledge, foster growth, and obtain continuing professional education credit. A wide variety of media exists by which programs may be delivered (i.e., video, audio, computers); the two-way interactive audio and video teleconferencing, however, most closely emulates an on-site educational program. When integrated facilities implement this form of distance education, relationships can be built whereby the instructor and participants grow to respect and trust one another over a period of time. In addition, instructors who provide distance education programs for radiographers must try to incorporate the principles of adult education. By doing so, the radiographers will hopefully not only view the program as a means of obtaining credit, but will learn and apply the material for the betterment of the health care field.

Community colleges who participate in delivering continuing professional education programs must take faculty concerns into consideration. Administrative support, adequate training, and monetary supplements may be necessary in order to encourage faculty to implement instructional technologies. Knowledge concerning factors relative to faculty attitudes towards distance education and other instructional technologies may assist the community college in promoting their implementation.

Community College Faculty Characteristics

According to Phillippe (1997), the average age for full-time community college faculty is 50-54 years of age. This is followed by 45-49, 40-44, and 55-59 years of age. Less than five percent of faculty members are 25-29 years of age.

As for degree attainment, Phillippe (1997) notes that 16.0% of full-time faculty members posses a Doctorate Degree while 65.1% have a Master's Degree, and 11.9% have a Bachelor's

Degree. Faculty members with less than a Bachelor's Degree comprise 4.8% of the total full-time faculty.

Lastly, according to a report by Snyder, Hoffman, and Geddes (1997), public 2-year institutions are comprised of 54.7 percent male faculty members and 45.3 percent female faculty members.

Conceptual Framework

The conceptual framework for this research is derived from the adult education field, health education field, and educational technology field. A review of the literature provided a basis for examining and clarifying the concepts that are of significance to this study. Figure 1 (adapted from Brower, 1992, p. 39) contains the frame of reference for the major concepts that are presented in this research.

Figure 1 represents the relationships and interrelationships between the hospital, outside sources, and the community college in regards to providing continuing professional education for radiographers. The top circle represents outside sources of continuing professional education for radiographers. Examples include conferences and workshops offered by professional societies as well as journals and video tapes that may be purchased by radiographers. As previously discussed, sources may focus on updating skills (e.g., how to implement a new procedure) or on growth (i.e., conflict resolution).

The bottom circle represents programs that are provided by the hospital and radiology department. Again, like the outside sources, programs may focus on up-dating skills (in-service) or on fostering growth (staff development). It must be noted, however, that some in-service programs provided by the hospital, or even the radiology department, may not qualify as continuing professional education credit for radiographers. Hence, the term in-service is used when referring to the hospital. Also note that the term staff development is used when referring to programs offered at the hospital (because these programs are intended to benefit the hospital

staff). Although the term staff development is used, these programs focus on growth related topics and issues.

The smallest circle, labeled community college, fits within the outside continuing professional education circle. This indicates that the community college has, as a part of its mission, the responsibility of providing continuing education to the community. Continuing education provided by the community college may be offered on-campus or off-campus. Off-campus here refers to the instructor (from the community college) physically attending the location where the program is being offered. Also note that the community college overlaps the hospital. This area represents programs that the community college offers the hospital, specifically the radiology department, via distance education.

Lastly, adult education principles apply to any continuing professional education program. Programs offered by the hospital, radiology department, or the community college (on-campus, off-site, distance education) may implement adult education principles to enhance the educational experience for the radiographers.

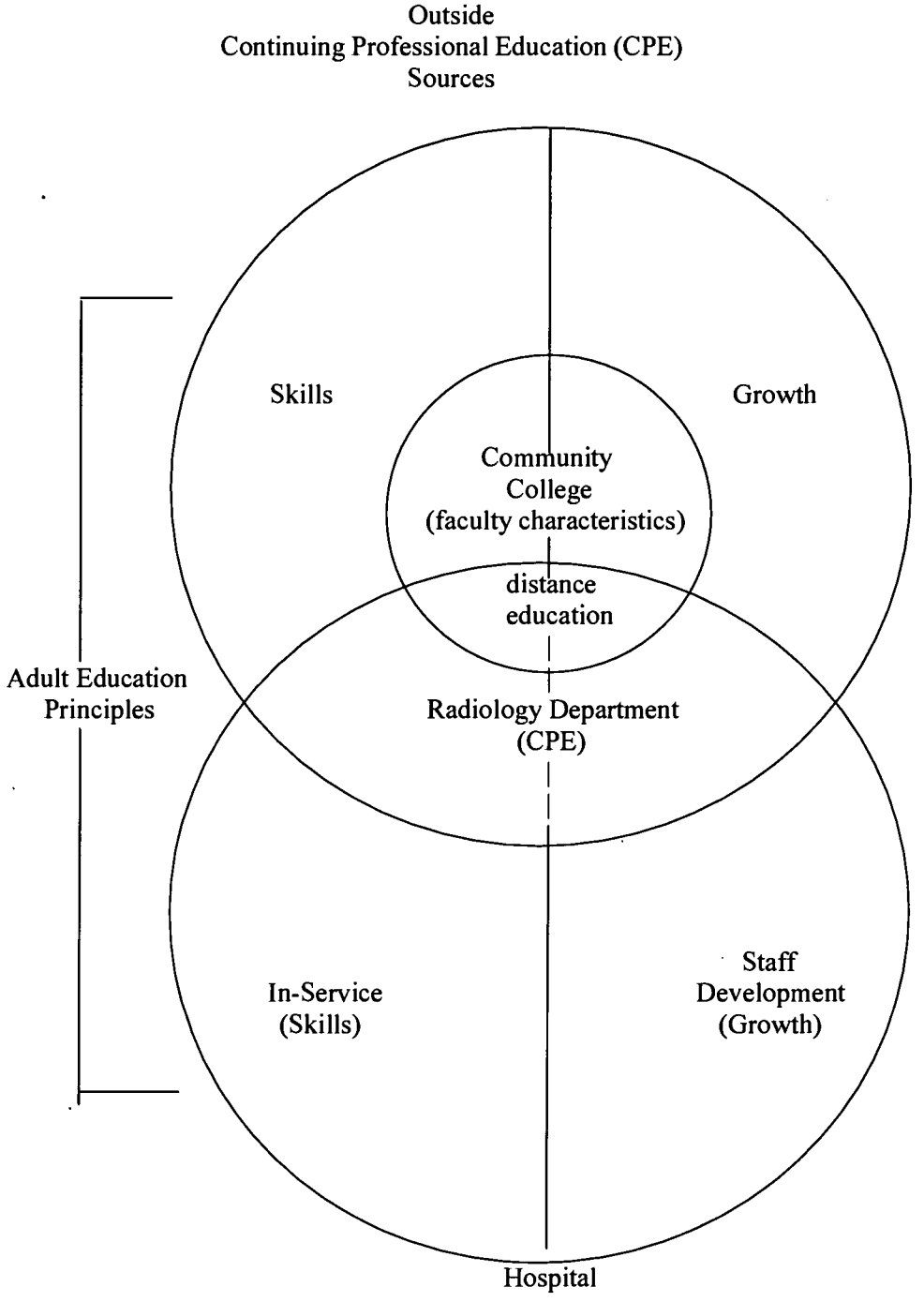

Figure 1. Framework for continuing professional education: Linking community colleges with area hospital Radiology Departments. (Adapted from Brower, 1992, p. 39)

Research Objectives

The objectives for this research, which have grown out of the conceptual framework, will include the following:

1. To provide a demographic profile of community college Radiologic Technology faculty.
2. To document various forms of instructional technology faculty have knowledge about and/or have experience using.
3. To determine if a relationship exists between faculty characteristics and attitudes concerning various forms of instructional technology.
4. To document information regarding instructional technology training.
5. To determine if a relationship exists between faculty characteristics and attitudes concerning distance education.
6. To document information regarding distance education training and distance education compensation.
7. To determine if a relationship exists between faculty characteristics and attitudes concerning continuing professional education.
8. To document the number of Radiologic Technology programs that have joined partnerships with area hospitals and to identify the number of programs that are offered per year.
9. To document whether or not Radiologic Technology faculty provide continuing professional education programs for radiographers in area hospitals.
10. To document how and how often Radiologic Technology programs provide continuing professional education programs for radiographers in area hospitals.

Chapter III
Methodology

Research Design

This study profiles the demographic characteristics of community college Radiologic Technology faculty nationwide as well as their attitudes towards instructional technology, distance education, and continuing professional education. In addition, this study provides data concerning the existence of integrated facilities and how often and by what means continuing professional education is offered to area radiographers. A survey research design was implemented to document these areas of interest. Choosing the survey method of inquiry was based upon the fact that surveys are comprehensive and efficient (Alreck & Settle, 1985). The comprehensive nature of surveys made it possible for this study to first, document various demographic variables related to Radiologic Technology faculty, and, second, to analyze various faculty attitudes. In addition to its comprehensive nature, surveys provide an efficient means of data gathering. Due to sampling, information about a population may be obtained from a relatively small sample of people. Since this research focused on characteristics and attitudes of Radiologic Technology faculty nationwide, the survey method provided an efficient method for obtaining data that may be inferred to the entire faculty population.

Population and Sample

The population for this research consisted of full-time faculty members surveyed from a random sample of Radiologic Technology programs in the contiguous United States. The sample for this research was selected based upon the following methodology. A list of all Radiologic Technology programs in the United States was obtained (American Medical Association, 1998). Only those programs that are offered at community colleges or community/technical colleges were included (only programs listed under colleges that identify themselves as "community colleges" as well as colleges that identify themselves as "community/technical colleges" were selected). This resulted in a total of 140 programs. The number of faculty employed at each

program was unknown; the data for this were unavailable. Therefore, the researcher implemented a logical ratio scheme to determine the number of surveys to be mailed to each Radiologic Technology program.

This ratio scheme enabled the researcher to estimate the number of faculty members at each program based on faculty-to-student ratios. North Carolina Radiologic Technology program data was used to determine this ratio due to the fact that North Carolina has the greatest number (14) of community college Radiologic Technology Programs (American Medical Association, 1998); therefore, these programs have a wide range of class capacities upon which the ratio was based. The ratio was calculated by the number of faculty members at each Radiologic Technology program in North Carolina versus class capacity. Class capacity is determined by the Joint Review Committee on Education in Radiologic Technology (the accrediting body for Radiologic Technology programs) and is based upon the number of clinical slots available for the students. In other words, every Radiologic Technology program is affiliated with a particular number of clinic sites (typically, hospitals serve as the clinic sites). Each clinic site is only able to accommodate a certain number of students, as determined by the Joint Review Committee. Therefore, each Radiologic Technology program may accept up to the maximum number of students that are permitted in the clinical sites. Information regarding the maximum class capacity for each Radiologic Technology program is available in the Health Professions Education Directory (1998-1999).

Calculating the ratio was achieved by dividing the Radiologic Technology programs in North Carolina into three categories: small (capacity of 1-16); medium (capacity of 17 - 26); and large (capacity of 27 and greater). The number of faculty at each North Carolina community college is known, thereby permitting the researcher to calculate faculty-to-student ratios for the 14 programs (as listed in the Health Professions Education Directory, 1998-1999). The lowest occurring ratio in each category was used to determine how many surveys should be mailed to each program within the sample population (the lowest ratio was used in an attempt to prevent

undermailing of the surveys). For example, if 3 large programs in North Carolina have ratios of 1:13, 1:13, and 1:10, the researcher used the 1:10 ratio to determine how many surveys should be sent to the large programs in the sample. By using this 1:10 ratio, programs having a class capacity of 35 were mailed 4 surveys (the number of faculty members was rounded up). Using the 1:13 ratio would have resulted in 3 surveys being mailed.

The researcher mailed surveys to 100 (71%) of the 140 randomly selected Radiologic Technology programs. Selection of the Radiologic Technology programs was accomplished by implementing simple random sampling. This method of sampling ensured that each member of the population had an equal chance of being selected (Borg & Gall, 1989). The researcher chose to include 100 programs in the study based on the following:

1. the number of faculty members at each program is unknown; therefore, the researcher is sending surveys to over one-half the population in an attempt to achieve an adequate response rate.
2. conducting a second mailing is not practical since the researcher is unable to identify individual faculty members.
3. a relatively large number ($\underline{N}$=200) of responses is needed to perform factor analysis.

The researcher mailed a total of 625 surveys to the Program Directors of the 100 randomly selected Radiologic Technology programs (see Appendix A). A letter of explanation accompanied the surveys (see Appendix B). Each Program Director was asked to distribute one survey to every full-time faculty member. Each survey contained a letter of explanation (see Appendix C) and an Informed Consent Form (see Appendix D). Every faculty member was provided with a self-addressed stamped envelope so the surveys could be returned individually.

Each Program Director was also sent a note to indicate how many surveys were distributed to each full-time faculty member (see Appendix E). A self-addressed stamped envelope was included so this note could be returned to the researcher for calculating the response rate. Forty-seven Program Directors returned the note resulting in a 47% response rate. The Program Directors indicated that 123 surveys had been distributed to their full-time faculty members. Of the 123 surveys that were distributed, 117 were received. Two surveys were discarded due to incomplete information. Therefore, 115 of 123 surveys were used for the analysis. This resulted in a 93% response rate.

Survey Instrument

As previously mentioned, this research will utilize the survey method of data gathering. The survey implemented for this research was developed by the researcher based upon the general literature review as well as upon the dissertations completed by Clark (1992), Fung (1994), Heath (1996), and Stinehart (1987). The survey consisted of Likert-type questions to address the following topics: (a) demographic information; (b) knowledge about and experience with instructional technologies (1=not knowledgeable/not experienced to 5=very knowledgeable/very experienced); (c) attitudes towards instructional technologies, distance education, and continuing professional education (1=strongly disagree to 4=strongly agree, with NS=not sure); and (d) factual information regarding institutional training for instructional technologies, institutional distance education training, and compensation for participating in distance education offerings (1=strongly disagree to 4=strongly agree, with NS=not sure). Responses marked as "not sure" were counted as a non-response item for analysis purposes. A "not sure" response was provided so respondents would not feel forced to have an opinion, thereby, decreasing the probability of inaccurate conclusions about the data.

The Likert format was chosen based upon the scale's ability to measure and quantify attitudes on a continuum (Alreck & Settle, 1985; Mueller, 1986). Care was also taken to construct statements that reflect both positive and negative attitudes towards the particular factor; including

both positive and negative statements helps alleviate the problem of "yea-sayer" and "nay-sayer" bias (Alreck & Settle, 1985; Mueller, 1986). In addition, the survey provided an open-ended question to list the types of continuing professional education activities offered by the respondent's department as well as how often the activities are offered.

It must be noted that the survey sections pertaining to instructional technology, distance education, and continuing professional education contain subsections. Questions in the instructional technology section were broken down according to traditional technologies (cassettes, transparencies, videos, and slides), and computer technologies (word processing, spreadsheets, e-mail, internet, computer-assisted instruction, presentation software, and CD-ROM discs). In addition the survey asked questions pertaining to institutional training and support of the traditional and computer technologies. The distance education section included subsections that addressed familiarity with distance education, knowledge of and willingness to offer distance education programs, institutional training and support, and institutional compensation for offering such programs. Lastly, the continuing professional education section addressed the purpose of continuing professional education, participation in continuing professional education activities, and willingness to offer such programs.

Validity of the survey instrument was accomplished in two ways. First, the survey was reviewed by one Radiologic Technology instructor at a Baccalaureate program in regards to face validity. It must be noted that face validity does not take the place of other forms of validity; the advantage, however, of face validity is that most respondents react favorably towards a survey that has high face validity thereby increasing the chances of cooperation (Borg & Gall, 1989).

After the responses were received from the sample population, evidence of construct validity was performed via exploratory factor analysis. Construct validity is the extent to which the survey measures a construct such as attitude (Borg & Gall, 1989). Factor analysis reduces the many variables to a few factors by combining the variables that are correlated with one another (Borg & Gall, 1989).

As previously mentioned, the survey consisted of three main categories which were broken down into subsections. Each category was subjected to exploratory factor analysis using squared multiple correlations as prior communality estimates. The principal factor method was used to extract the factors which was then followed by a promax (oblique) rotation.

Output from the exploratory factor analysis consisted of (a) proportion of variance accounted for, (b) scree test, and (c) interpretability criteria (rotated factor pattern). Hatcher (1994) suggests reviewing all three outputs to maximize one's chances of correctly determining the number of factors to retain. Hatcher notes, however, that the most important criteria to use when determining the number of factors to retain is the interpretability criteria. The interpretability criteria guidelines are as follows: (a) there must be at least three variables with significant loadings (.40 or higher) on each factor; (b) variables that load together on any given factor should share some conceptual meaning; and (c) variables that load on different factors should be measuring different constructs; and (d) the rotated factor pattern should demonstrate "simple structure" (Hatcher). Simple structure criteria is demonstrated when (a) variables have high loadings on one factor and near-zero loadings on the other factors, and (b) each factor has high loadings for some variables and near-zero loadings on the other variables (Hatcher).

Using the aforementioned criteria, seven empirical and logical factors emerged from exploratory factor analysis. Variables were omitted that (a) did not load on any factor, (b) loaded on more than one factor, (c) had a negative loading, and (d) were not conceptually related to the factor on which it loaded. In addition, Cronbach's Alpha was computed for the variables retained by exploratory factor analysis in order to determine each factor's internal consistency. Cronbach's alpha is most appropriate for surveys whose items are not scored as dichotomous, as is the case with this survey (Borg & Gall, 1989). An alpha of .60 was considered acceptable. Cronbach's alpha is provided in Table 1, Table 2, and Table 3 along with the factor analysis results (see below).

First, 33 of 71 instructional technology questions were subjected to exploratory factor analysis; two factors were retained (see Table 1). The first factor, Traditional Technologies, retained nine out of twelve questions; questions 37, 38, and 39 were omitted from the analysis. The second factor, Computer Technologies, retained 18 out of 21 questions; questions 49, 50, and 51 were omitted from the analysis. Thirty-eight questions were not factor analyzed due to their factual versus attitudinal orientation; responses for these questions were summarized using descriptive statistics. These factual questions represent responses in regards to *knowledge* about and *experience* with a) traditional instructional technologies, b) computer instructional technologies, c) conferencing instructional technologies, and d) any other form of instructional technologies. In addition, responses were summarized for the factual questions regarding institutional training/support for instructional technologies.

Table 1. Summary statistics and factor analysis results for items loading over .40 for instructional technology

Factor and Questions	Mean	SD	Loading
Factor I (Alpha=.87)			
- Traditional Technologies (TRADTECH)			
Transparency Importance	1.6	.63	.75
Video Importance	1.6	.52	.59
Slides Importance	1.6	.63	.68
Transparency Convenience	1.6	.65	.81
Video Convenience	1.5	.52	.70
Slides Convenience	1.6	.69	.71

Table 1. Continued

Transparency Use	1.5	.60	.75
Video Use	1.4	.50	.76
Slides Use	1.6	.65	.67
Factor II (Alpha=.91)			
- Computer Technologies (COMPTECH)			
Spreadsheet Importance	1.8	.73	.57
E-Mail Importance	1.4	.49	.42
Internet Importance	1.7	.68	.48
CAI Importance	1.7	.70	.71
Presentation Software Importance	1.6	.56	.68
CD-ROM Importance	1.7	.55	.68
Spreadsheet Convenience	2.0	.79	.69
E-Mail Convenience	1.4	.57	.59
Internet Convenience	1.8	.77	.52
CAI Convenience	1.9	.74	.67
Presentation Software Convenience	1.9	.70	.74
CD-ROM Convenience	1.8	.69	.72
Spreadsheet Use	2.1	.79	.68
E-Mail Use	1.5	.58	.52
Internet Use	1.9	.74	.50
CAI Use	1.8	.73	.54
Presentation Software Use	2.1	.73	.72
CD-ROM Use	1.8	.64	.78

Second, 15 of 26 distance education questions were subjected to factor analysis; two factors were retained (see Table 2). Six questions (79, 80, 81, 82, 84, 92) were reverse coded so as not to result in negative loadings. The first factor, Familiarity with Distance Education, retained five out of eight questions; questions 78, 83, and 85 were omitted from the analysis. The second factor, Offering of Distance Education, retained five out of seven questions; questions 86 and 92 were omitted from the analysis. Six questions were not factor analyzed due to their factual versus attitudinal orientation; responses for these questions were summarized using descriptive statistics. These questions elicited responses regarding institutional training for distance education. In addition, it must be noted that 20 of 26 questions were originally factor analyzed; five questions pertaining to compensation for offering distance education programs did not factor out. Therefore, they were omitted from exploratory factor analysis (leaving a total of 15 questions) and the responses to these five questions were summarized using descriptive statistics.

Table 2. Summary statistics and factor analysis results for items loading over .40 for distance education

Factor and Questions	Mean	SD	Loading
Factor I (Alpha=.78)			
- Familiarity with Distance Education (DEFAM)			
Time Consuming	2.4	.70	.54
Planning	2.5	.69	.59
Scheduling	2.5	.66	.51
Fad	3.2	.66	.84
Impersonal	2.6	.75	.56
Factor II (Alpha=.86)			
- Offering of Distance Education (DEOFF)			
Department Obligation	1.8	.72	.86

Table 2. Continued

Willingness to Offer	2.2	.89	.53
Accessibility	1.6	.59	.74
Partnerships	2.0	.89	.88
Beneficial	1.8	.67	.78

Lastly, 30 of 30 continuing professional education questions were subjected to factor analysis. Three factors were retained (see Table 3). The first factor, Purpose of Continuing Professional Education, retained four out of seven questions; questions 108, 109, and 110 were omitted from the analysis. The second factor, Participation in Continuing Professional Education retained 15 out of 17 questions; questions 116 and 123 were omitted from the analysis. The third factor, Offering of Continuing Professional Education, retained four out of six questions; questions 129 and 133 were omitted from the analysis.

Table 3. Summary statistics and factor analysis results for items loading over .40 for continuing professional education

Factor and Questions	Mean	SD	Loading
Factor I (Alpha=.90)			
- Purpose of Continuing Professional Education (CEPURP)			
Professionalism	3.3	.88	.88
Technology and Skills	3.4	.72	.78
Application of Information	2.9	.73	.86
Quality Patient Care	3.0	.79	.68

Table 3. Continued

Factor II (Alpha=.86)			
- Participation in Continuing Professional Education (CEPART)			
Stimulating	3.2	.58	.64
Comfort with Skills and Knowledge	3.4	.57	.62
Motivation	3.2	.71	.66
Time	3.6	.55	.64
Performance	3.1	.82	.54
Enjoyment	3.4	.54	.68
Money	3.2	.58	.75
Required	3.4	.74	.55
Importance	3.7	.53	.66
Uncomfortable	3.6	.61	.82
Discretion	3.3	.72	.72
Obtaining Credit	3.5	.50	.66
Journals	3.4	.64	.46
Videos	3.3	.57	.52
Options	3.5	.78	.45
Factor III (Alpha=.63)			
- Offering of Continuing Professional Education (CEOFF)			
Conducting	2.9	.84	.72

Table 3. Continued

Offering	3.2	.69	.54
Obligation to Offer	2.2	.90	.48
Expectation	2.6	.73	.55

Analysis

The data were analyzed using SAS version 6.12 for descriptive statistics, t-tests and One-Way Analysis of Variance (ANOVA). The independent variables used for analysis were the seven factors derived from exploratory factor analysis: (TRADTECH, COMPTECH, DEFAM, DEOFF, CEPURP, CEPART, CEOFF). The dependent variables were the faculty characteristics: academic position (POSITION), years as a Radiologic Technology instructor (YEARS), educational level (LEVEL), age (AGE), and gender (GENDER).

Following is the list of research objectives along with the analysis procedures.

1. To provide a demographic profile of community college Radiologic Technology faculty. (Descriptive statistics - frequencies and percentages)
2. To document various forms of instructional technology faculty have knowledge about and/or have experience using. (Descriptive statistics - frequencies and percentages)
3. To determine if a relationship exists between faculty characteristics and attitudes concerning various forms of instructional technology. (Inferential statistics - t-tests, $p<.05$; ANOVA, $p<.05$)
4. To document information regarding instructional technology training. (Descriptive statistics – frequencies and percentages)
5. To determine if a relationship exists between faculty characteristics and attitudes concerning distance education. (Inferential statistics – t-tests, $p<.05$; ANOVA, $p<.05$)
6. To document information regarding distance education training and distance education compensation. (Descriptive statistics – frequencies and percentages)

7. To determine if a relationship exists between faculty characteristics and attitudes concerning continuing professional education. (Inferential statistics – t-tests, $p<.05$; ANOVA, $p<.05$)
8. To document the number of Radiologic Technology programs that have joined partnerships with area hospitals and to identify the number of programs that are offered per year. (Descriptive statistics – frequencies and percentages)
9. To document whether or not Radiologic Technology faculty provide continuing professional education programs for radiographers in area hospitals. (Descriptive statistics – frequencies and percentages)
10. To document how and how often Radiologic Technology programs provide continuing professional education programs for radiographers in area hospitals. (Written summary)

Summary

This research surveyed a random sample of community college Radiologic Technology faculty across the contiguous United States. Due to a lack of information pertaining to the number of Radiologic Technology faculty members at each community college, survey packets were mailed to the Program Directors at 100 of the randomly selected institutions. The Program Directors were asked to distribute the surveys to their full-time faculty members.

The survey consisted of Likert-type questions to elicit: (a) demographic information, (b) knowledge/experience with various instructional technologies, (c) attitudes towards instructional technologies, distance education, and continuing professional education, and (d) factual information regarding institutional training for instructional technology and distance education, and compensation for offering distance education programs. In addition, an open-ended question elicited information regarding the types of continuing professional programs offered by the Radiologic Technology faculty as well as how often the programs are offered. The attitudinal sections of the survey were subjected to exploratory factor analysis in order to establish content validity.

Chapter IV

Analysis

The purpose of this study was to determine the existence of integrated facilities as well as to determine community college Radiologic Technology faculty attitudes towards instructional technology, distance education, and continuing professional education. The survey method was utilized for gathering this information; 115 of 123 surveys were included in the analysis. This represented a 93% response rate. It must be noted that not every table presented in this chapter has an N=115. The reason is twofold: first, some questions were omitted by the respondents and were, therefore, not available for analysis; and, second, responses marked "not sure" (NS) were not included in the analysis.

This chapter summarizes the demographic information and states the statistical procedures and survey results of the aforementioned faculty attitudes. Each research objective is restated and presented along with its findings.

Research Objective 1: To provide a demographic profile of community college Radiologic Technology faculty.

This objective addressed the demographic characteristics including academic position, years as a Radiologic Technology instructor, educational level, age, and gender.

Demographic Profile. Table 1 depicts the demographic characteristics reported by the Radiologic Technology faculty. First, a total of 108 faculty members reported their academic positions; ninety-three respondents (86%) indicated that their primary role was didactic, while 15 respondents (14%) indicated clinical as their primary role. Second, the respondents reported on the number of years they have worked as Radiologic Technology instructors; years ranged from 1 to 33 (M=13.88). For ease of viewing, the responses have been categorized. Third, respondents were asked to indicate their highest attained educational level. A majority (55%, n=60) of the respondents possess a Master's Degree. Fourth, respondents were asked to mark their age according to a range. A majority (56%, n=62) of the instructors indicated that they are between

the ages of 41-50, which also represents the average age. No respondents indicated being from 20-25 years of age. Lastly, a majority (68%, n=75) of the instructors are female.

Table 1. Demographic profile of community college Radiologic Technology faculty

Academic Position	Frequency	Percent
Didactic Instructor	93	86
Clinical Instructor	15	14
Total	108	100

Instructor Years	Frequency	Percent
1-5	17	16
6-10	31	28
11-15	19	18
16-20	19	17
21-25	14	13
> 25	9	8
Total	109	100

Educational Level	Frequency	Percent
Certificate	5	5
Associates Degree	11	10
Bachelors Degree	33	30
Masters Degree	60	55
Doctoral Degree	1	1
Total	110	100

Table 1. Continued

Age	Frequency	Percent
20-25 years	0	0
26-30 years	4	4
31-35 years	8	7
36-40 years	14	13
41-45 years	29	26
46-50 years	33	30
51-55 years	14	13
56+ years	9	8
Total	111	100

Gender	Frequency	Percent
Male	36	32
Female	75	68
Total	111	100

To summarize the faculty characteristics: a majority (68%, n=75) of Radiologic Technology instructors are female, between the ages of 41-50 (56%, n=62), hold a Masters Degree (55%, n=60), and have worked as an instructor for 11 or more years (56%, n=61). Eighty-six percent (n=93) are didactic instructors.

Research Objective 2: To document various forms of instructional technologies faculty have knowledge about and/or experience using.

This objective addressed faculty knowledge about and/or experience with the following instructional technologies: (a) traditional technologies - audio, video, slides, and transparencies; (b) computer technologies - word processing, spreasheets, CD-ROM, internet, e-mail, computer-

assisted instruction, and presentation software; and (c) conferencing technologies - one-way audio/one-way video, two-way audio/one-way video, and two-way audio/two-way video. Responses for these questions ranged from 1=not knowledgeable/not experienced to 5=very knowledgeable/very experienced.

Audio. This was the first of four questions addressing traditional technologies. Table 2 provides information regarding the respondents knowledge about cassette tapes (M=4.58) as well as their experience using them (M=4.36) in instructional situations. A majority of respondents are very knowledgeable about (72%, n=82) and very experienced with (64%, n=72) using cassettes. Audio ranked fourth of the four traditional technologies.

Table 2. Radiologic Technology faculty knowledge about audio and experience using audio

Audio Knowledge	Frequency	Percent
Not Knowledgeable	1	1
Less Than Average Knowledge	1	1
Average Knowledge	11	10
Above Average Knowledge	19	17
Very Knowledgeable	82	72
Total	114	100

Audio Experience	Frequency	Percent
Not Experienced	4	4
Less Than Average Experience	6	5
Average Experience	7	6
Above Average Experience	24	21
Very Experienced	72	64
Total	113	100

Video. No respondent indicated a level of not knowledgeable or not experienced with video (see Table 3). In fact, a majority (74%, n=85) of the respondents indicated a high level of video knowledge. Likewise, a majority (69%, n=79) indicated that they are very experienced with using videos. Means for knowledge and experience were 4.69 and 4.61, respectively. This technology ranked third of the four traditional technologies.

Table 3. Radiologic Technology faculty knowledge about video and experience using video

Video Knowledge	Frequency	Percent
Average Knowledge	6	5
Above Average Knowledge	24	21
Very Knowledgeable	85	74
Total	115	100

Video Experience	Frequency	Percent
Less Than Average Experience	2	2
Average Experience	5	4
Above Average Experience	29	25
Very Experienced	79	69
Total	115	100

Slides. As with video, a majority of respondents reported a high level of knowledge about slides (82%, n=94) and experience using them (77%, n=89) (see Table 4). No respondents indicated that no knowledge or no experience with slides. The mean for knowledge was 4.79 and 4.72 for experience ranking this technology as the number one traditional technology.

Table 4. Radiologic Technology faculty knowledge about slides and experience using slides

Slide Knowledge	Frequency	Percent
Average Knowledge	3	3
Above Average Knowledge	18	16
Very Knowledgeable	94	82
Total	115	100

Slide Experience	Frequency	Percent
Less Than Average Experience	1	1
Average Experience	4	4
Above Average Experience	21	18
Very Experienced	89	77
Total	115	100

Transparencies. No respondent indicated a lack of knowledge or experience with transparencies (see Table 5). In fact, 82% (n=94) reported a high level of knowledge with transparencies. In addition, 77% (n=88) indicated they possess a lot of experience with using transparencies. Transparencies followed closely in second place with a knowledge mean of 4.75 and an experience mean of 4.70.

Table 5. Radiologic Technology faculty knowledge about transparencies and experience using transparencies

Transparency Knowledge	Frequency	Percent
Average Knowledge	8	7
Above Average Knowledge	13	11
Very Knowledgeable	94	82
Total	115	100

Transparency Experience	Frequency	Percent
Average Experience	7	6
Above Average Experience	20	17
Very Experienced	88	77
Total	115	100

Word Processing. This question was the first of seven questions addressing computer technologies (see Table 6). A majority of respondents (65%, n=75) reported that they are very knowledgeable about (M=4.46) word processing. A majority (59%, n=68) also reported a high level of experience using (M=4.31) word processing. Word processing was the highest ranking computer technology out of seven.

Table 6. Radiologic Technology faculty knowledge about word processing and experience using word processing

Word Processing Knowledge	Frequency	Percent
Not Knowledgeable	2	2
Less Than Average Knowledge	5	4
Average Knowledge	6	5
Above Average Knowledge	27	24
Very Knowledgeable	75	65
Total	115	100

Word Processing Experience	Frequency	Percent
Not Experienced	4	4
Less Than Average Experience	6	5
Average Experience	8	7
Above Average Experience	29	25
Very Experienced	68	59
Total	115	100

Spreadsheets. Sixty-eight percent (n=79) indicated that they have average to high levels of knowledge about spreadsheets (see Table 7). Also, a majority (63%, n=73) possess average to high levels of experience with spreadsheets. This technology ranked last of seven with a knowledge mean of 3.17 and an experience mean of 3.07.

Table 7. Radiologic Technology faculty knowledge about spreadsheets and experience using spreadsheets

Spreadsheet Knowledge	Frequency	Percent
Not Knowledgeable	12	10
Less Than Average Knowledge	24	21
Average Knowledge	35	30
Above Average Knowledge	20	17
Very Knowledgeable	24	21
Total	115	100

Spreadsheet Experience	Frequency	Percent
Not Experienced	17	15
Less Than Average Experience	25	22
Average Experience	29	25
Above Average Experience	21	18
Very Experienced	23	20
Total	115	100

CD-ROM. Eighty-seven percent (n=100) reported average to high levels of knowledge about (M=3.91) CD-ROMs (see Table 8). In addition, 83% (n=96) indicated that they have average to high levels of experience using (M=3.71) CD-ROMs. CD-ROM technology ranked fourth of the seven computer technologies.

Table 8. Radiologic Technology faculty knowledge about CD-ROMs and experience using CD-ROMs

CD-ROM Knowledge	Frequency	Percent
Not Knowledgeable	7	6
Less Than Average Knowledge	8	7
Average Knowledge	17	15
Above Average Knowledge	39	34
Very Knowledgeable	44	38
Total	115	100

CD-ROM Experience	Frequency	Percent
Not Experienced	10	9
Less Than Average Experience	9	8
Average Experience	23	20
Above Average Experience	35	30
Very Experienced	38	33
Total	115	100

Internet. Average to high levels of internet knowledge were reported by a majority (88%, n=101) of respondents (see Table 9). Eighty-six percent (n=99) also indicated average to very experienced with using the internet. Means for knowledge and experience were 3.94 and 3.81, respectively. The internet ranked third of the seven computer technologies.

Table 9. Radiologic Technology faculty knowledge about the internet and experience using the internet

Internet Knowledge	Frequency	Percent
Not Knowledgeable	4	4
Less Than Average Knowledge	10	9
Average Knowledge	14	12
Above Average Knowledge	48	42
Very Knowledgeable	39	34
Total	115	100

Internet Experience	Frequency	Percent
Not Experienced	5	4
Less Than Average Experience	11	10
Average Experience	21	18
Above Average Experience	42	37
Very Experienced	36	31
Total	115	100

E-Mail. An overwhelming majority (94%, n=108) of the respondents indicated that they have average to high levels of knowledge about e-mail (see Table 10). In addition, 87% (n=100) reported having average to high levels of experience with using e-mail. E-mail was the second highest ranking computer technology with a knowledge mean of 4.22 and an experience mean of 4.00.

Table 10. Radiologic Technology faculty knowledge about e-mail and experience using e-mail

E-Mail Knowledge	Frequency	Percent
Not Knowledgeable	2	2
Less Than Average Knowledge	5	4
Average Knowledge	17	15
Above Average Knowledge	33	29
Very Knowledgeable	58	50
Total	115	100

E-Mail Experience	Frequency	Percent
Not Experienced	9	8
Less Than Average Experience	6	5
Average Experience	20	17
Above Average Experience	26	23
Very Experienced	54	47
Total	115	100

Computer-Assisted Instruction (CAI). As for CAI, a majority (86%, n=99) of the respondents indicated that they are average to very knowledgeable about this technology (see Table 11). Also, a majority (78%, n=88) of the respondents are average to very experienced with using CAI. The knowledge mean was 3.79 and the experience mean was 3.47 ranking this technology fifth of the seven computer technologies.

Table 11. Radiologic Technology faculty knowledge about CAI and experience using CAI

CAI Knowledge	Frequency	Percent
Not Knowledgeable	5	4
Less Than Average Knowledge	11	10
Average Knowledge	22	19
Above Average Knowledge	42	37
Very Knowledgeable	35	30
Total	115	100

CAI Experience	Frequency	Percent
Not Experienced	13	11
Less Than Average Experience	13	11
Average Experience	23	20
Above Average Experience	37	33
Very Experienced	28	25
Total	114	100

Presentation Software. A majority (78%, n=89) of respondents reported having average to very high knowledge about presentation software (see Table 12). Sixty-seven percent (n=77) indicated average to high experience using it. This technology ranked sixth with a knowledge mean of 3.53 and an experience mean of 3.22.

Table 12. Radiologic Technology faculty knowledge about presentation software and experience using presentation software

Presentation Software Knowledge	Frequency	Percent
Not Knowledgeable	10	9
Less Than Average Knowledge	16	14
Average Knowledge	25	22
Above Average Knowledge	31	27
Very Knowledgeable	33	29
Total	115	100

Presentation Software Experience	Frequency	Percent
Not Experienced	18	16
Less Than Average Experience	20	17
Average Experience	22	19
Above Average Experience	28	24
Very Experienced	27	24
Total	115	100

One-Way Audio/One-Way Video. This question was the first of three questions addressing conferencing technologies. Unlike the traditional and computer technologies, respondents indicated less knowledge about and experience with the conferencing technologies. Fifty-seven percent (n=65) of the respondents indicated no knowledge to little knowledge about one-way audio/one-way video (see Table 13). Likewise, a majority (75%, n=85) of them indicated no experience to little experience with this technology. Mean knowledge was 2.44 and mean experience was 2.02 ranking this technology first of the three conferencing technologies.

Table 13. Radiologic Technology faculty knowledge about one-way audio/one-way video and experience using one-way audio/one-way video

One-Way Audio/One-Way Video Knowledge	Frequency	Percent
Not Knowledgeable	31	27
Less Than Average Knowledge	34	30
Average Knowledge	27	24
Above Average Knowledge	14	12
Very Knowledgeable	9	8
Total	115	100

One-Way Audio/One-Way Video Experience	Frequency	Percent
Not Experienced	52	46
Less Than Average Experience	33	29
Average Experience	10	9
Above Average Experience	12	11
Very Experienced	7	6
Total	114	100

Two-Way Audio/One-Way Video. Like the one-way audio/video, a majority (62%, n=72) of respondents indicated no knowledge to little knowledge about this technology (see Table 14); and, in addition, a majority (80%, n=92) reported no experience to little experience. A knowledge mean of 2.24 and an experience mean of 1.78 ranked this technology third of the three conferencing technologies.

Table 14. Radiologic Technology faculty knowledge about two-way audio/one-way video and experience using two-way audio/one-way video

Two-Way Audio/One-Way Video Knowledge	Frequency	Percent
Not Knowledgeable	37	32
Less Than Average Knowledge	35	30
Average Knowledge	26	23
Above Average Knowledge	12	10
Very Knowledgeable	5	4
Total	115	100

Two-Way Audio/One-Way Video Experience	Frequency	Percent
Not Experienced	60	52
Less Than Average Experience	32	28
Average Experience	13	11
Above Average Experience	8	7
Very Experienced	2	2
Total	115	100

Two-Way Audio/Two-Way Video. The results of this technology were basically the same as the previous two. A majority (63%, n=73) reported no knowledge to little knowledge about this technology (see Table 15). In addition, 78% (n=89) indicated no experience to little experience. Means for this technology were 2.29 for knowledge and 1.86 for experience. This technology ranked second of the three.

Table 15. Radiologic Technology faculty knowledge about two-way audio/two-way video and experience using two-way audio/two-way video

Two-Way Audio/Two-Way Video Knowledge	Frequency	Percent
Not Knowledgeable	36	31
Less Than Average Knowledge	37	32
Average Knowledge	23	20
Above Average Knowledge	11	10
Very Knowledgeable	8	7
Total	115	100

Two-Way Audio/Two-Way Video Experience	Frequency	Percent
Not Experienced	57	50
Less Than Average Experience	32	28
Average Experience	13	11
Above Average Experience	10	9
Very Experienced	3	3
Total	115	100

Other. Lastly, an "other" category was provided for respondents to indicate to what extent they were knowledgeable about or experienced with some technology that was not included in the survey. The results of the knowledge and experience are presented in Table 16.

Table 16. Radiologic Technology faculty knowledge about other technologies and experience using other technologies

Other Knowledge	Frequency	Percent
Not Knowledgeable	13	38
Less Than Average Knowledge	5	15
Average Knowledge	10	29
Above Average Knowledge	2	6
Very Knowledgeable	4	12
Total	34	100

Other Experience	Frequency	Percent
Not Experienced	18	55
Less Than Average Experience	4	12
Average Experience	6	18
Above Average Experience	1	3
Very Experienced	4	12
Total	33	100

To summarize: Faculty indicated that they possess the highest level of knowledge about and experience with the traditional technologies. Of the traditional technologies, faculty knowledge about and experience with slides ranked highest followed by transparencies, video, and audio. Word processing knowledge and experience ranked highest among the computer technologies. Most of the responding faculty members possess average to above average word processing knowledge and experience. Average to above average knowledge about and experience with e-mail, the internet, CD-ROMs, CAI, presentation software, and spreadsheets were also indicated. Conferencing technologies ranked lowest among faculty members. More than half of the faculty members reported no to little knowledge about and experience with these technologies.

Research Objective 3: To determine if a relationship exists between faculty characteristics and attitudes concerning various forms of instructional technology.

This objective addressed the relationship between the following variables: (a) dependent variables-academic position (POSITION), years as a Radiologic Technology instructor (YEARS), educational level (LEVEL), age (AGE), and gender (GENDER); and, (b) independent variables-traditional technologies (TRADTECH), and computer technologies (COMPTECH). As discussed in Chapter 3, TRADTECH resulted from exploratory factor analysis. TRADTECH includes the following technologies: audio, video, slides, and transparencies. COMPTECH includes the following technologies: word processing, spreasheets, CD-ROM, internet, e-mail, computer-assisted instruction, and presentation software.

The survey questions asked the respondents to indicate on a scale of 1 to 4 (1=strongly disagree to 4=strongly agree) the *importance*, *convenience*, and *ease of use* of these various technologies. All relationships were analyzed using SAS version 6.12. T-tests and One-Way Analysis of Variance (ANOVA) were performed. The alpha level was set at $p<.05$.

Faculty Characteristics and Traditional Technologies. Results revealed that the relationship between each faculty characteristic (POSITION, GENDER, YEARS, LEVEL, AGE) and TRADTECH was not significant at $p<.05$ (see Tables 17-21).

Table 17. T-test for significant differences between traditional technologies and the Radiologic Technology faculty's academic position

POSITION	n	Mean	SD	SE	df	t	p
Didactic	93	3.47	0.43	0.04	106	0.84	0.40
Clinical	15	3.37	0.37	0.10			
Total	108						

Table 18. T-test for significant differences between traditional technologies and the Radiologic Technology faculty's gender

GENDER	n	Mean	SD	SE	df	t	p
Male	36	3.40	0.43	0.07	109	-0.92	0.36
Female	75	3.47	0.42	0.05			
Total	111						

Table 19. Analysis of Variance for significant differences between traditional technologies and years as a Radiologic Technology instructor

Source	df	SS	MS	F	p
YEARS	30	5.10	0.17	0.90	0.61
error	78	14.66	0.19		

YEARS	N	M	SD
1-5	17	3.37	0.46
6-10	31	3.47	0.38
11-15	19	3.52	0.44
16-20	19	3.27	0.41
21-25	14	3.51	0.53
>25	9	3.61	0.43
Total	109		

Table 20. Analysis of Variance for significant differences between traditional technologies and the Radiologic Technology faculty's educational level

Source	df	SS	MS	F	p
LEVEL	4	1.26	0.31	1.79	0.14
error	105	18.44	0.18		

LEVEL	N	M	SD
Certificate	5	3.27	0.32
Associate	11	3.19	0.43
Bachelor	33	3.48	0.46
Master	60	3.49	0.40
Doctorate	1	3.00	0.00
Total	110		

Table 21. Analysis of Variance for significant differences between traditional technologies and the Radiologic Technology faculty's age

Source	df	SS	MS	F	p
AGE	6	0.36	0.06	0.32	0.93
error	104	19.45	0.19		

AGE	N	M	SD
26-30	4	3.61	0.48
31-35	8	3.40	0.42
36-40	14	3.40	0.39
41-45	29	3.45	0.49
46-50	33	3.42	0.42
51-55	14	3.56	0.40
56+	9	3.46	0.39
Total	111		

To summarize: no faculty characteristics were found to be significant at $p<.05$ in regards to TRADTECH.

Faculty Characteristics and Computer Technologies. Results revealed that the relationship between each faculty characteristic (POSITION, GENDER, YEARS, LEVEL, AGE) and COMPTECH was not significant at $p<.05$ (see Tables 22-26).

Table 22. T-test for significant differences between computer technologies and the Radiologic Technology faculty's academic position

POSITION	n	Mean	SD	SE	df	t	p
Didactic	91	3.24	0.41	0.04	103	0.33	0.74
Clinical	14	3.20	0.45	0.12			
Total	105						

Table 23. T-test for significant differences between computer technologies and the Radiologic Technology faculty's gender

GENDER	n	Mean	SD	SE	df	t	p
Male	36	3.23	0.39	0.07	106	-0.07	0.94
Female	72	3.24	0.42	0.05			
Total	108						

Table 24. Analysis of Variance for significant differences between computer technologies and years as a Radiologic Technology instructor

Source	df	SS	MS	F	p
YEARS	30	4.43	0.15	0.84	0.70
error	75	13.17	0.18		

YEARS	N	M	SD
1-5	15	3.23	0.30
6-10	30	3.26	0.40
11-15	19	3.23	0.36
16-20	19	3.30	0.35
21-25	14	3.23	0.52
>25	9	3.14	0.30
Total	106		

Table 25. Analysis of Variance for significant differences between computer technologies and the Radiologic Technology faculty's educational level

Source	df	SS	MS	F	p
LEVEL	4	0.61	0.15	0.88	0.48
error	102	17.52	0.17		

LEVEL	N	M	SD
Certificate	4	3.20	0.39
Associate	11	3.06	0.45
Bachelor	33	3.29	0.35
Master	58	3.25	0.44
Doctorate	1	2.83	0.00
Total	107		

Table 26. Analysis of Variance for significant differences between computer technologies and the Radiologic Technology faculty's age

Source	df	SS	MS	F	p
AGE	6	1.14	0.19	1.13	0.35
error	101	17.00	0.17		

AGE	N	M	SD
26-30	4	3.38	0.27
31-35	8	3.24	0.32
36-40	14	3.28	0.46
41-45	28	3.35	0.42
46-50	31	3.09	0.40
51-55	14	3.22	0.42
56+	9	3.23	0.43
Total	108		

To summarize: no faculty characteristics were found to be significant at $p<.05$ in regards to COMPTECH.

Research Objective 4: To document information regarding instructional technology training.

Eight survey questions were oriented towards gathering factual information rather than attitudinal information. Questions elicited information about institutional encouragement, support, and training for instructional technologies. Responses ranged from 1 to 4 (1=strongly disagree to 4=strongly agree).

Institutional Encouragement. This question asked respondents to indicate whether or not their institutions encourage the use of traditional technologies. A majority (97%, n=108) of the respondents agreed (M=3.50) that their institution supports the use of traditional technologies (see Table 27).

Table 27. The number of Radiologic Technology faculty indicating the existence of institutional encouragement for using traditional technologies

Encouragement	Frequency	Percent
SD	2	2
D	2	2
A	51	46
SA	57	51
Total	112	100

Technical Support for Traditional Technologies. This question asked respondents to indicate the extent to which technical support was needed when using traditional technologies. A majority (92%, n=102) agreed (M=3.41) that little or no technical support was required (see Table 28).

Table 28. The number of Radiologic Technology faculty reporting the need for technical support when using traditional technologies

Technical Support	Frequency	Percent
SD	1	1
D	8	7
A	49	44
SA	53	48
Total	111	100

Use of Computer Technologies: When asked whether or not the respondent's institution encouraged the use of computer technologies, the majority (98%, n=109) agreed (M=3.50) that it is encouraged (see Table 29).

Table 29. The number of Radiologic Technology faculty indicating the existence of institutional encouragement for using computer technologies

Encouragement	Frequency	Percent
SD	1	1
D	2	2
A	51	46
SA	58	52
Total	112	100

Computer Technologies Training Sessions. When asked whether or not institutions provided adequate computer technologies training sessions, the majority (68%, n=74) agreed (M=2.92) that their institutions offer adequate training (see Table 30).

Table 30. The number of Radiologic Technology faculty reporting on the institutional provision of adequate computer technologies training sessions

Training Sessions	Frequency	Percent
SD	11	10
D	25	23
A	36	33
SA	38	35
Total	110	100

Times for Computer Technologies Training Sessions. Respondents were asked to indicate whether or not training sessions were offered during times that were convenient for them. A majority (57%, n=62) agreed that times were not convenient (M=2.46) for them (see Table 31).

Table 31. The number of Radiologic Technology faculty indicating the convenience of their institutions scheduling of computer technologies training sessions

Convenient Times	Frequency	Percent
SD	15	14
D	31	29
A	51	47
SA	11	10
Total	108	100

Time for Participation in Training Sessions. Respondents where asked about their time constraints relative to particpating in computer technologies training sessions. Fifty-three respondents (50%) agreed that the sessions are too time consuming (see Table 32). The mean for this variable was 2.45.

Table 32. The number of Radiologic Technology faculty indicating time as a factor that determines participation in computer technologies training sessions

Time	Frequency	Percent
SD	11	11
D	42	40
A	47	44
SA	6	6
Total	106	100

Participation in Training Session. When asked whether or not they have participated in a computer technologies training session, 89% (n=101) reported that they have participated (see Table 33). The mean for this variable was 3.21.

Table 33. The number of Radiologic Technology faculty who have participated in a computer technologies training session

Training Session	Frequency	Percent
SD	1	1
D	11	10
A	66	58
SA	35	31
Total	113	100

Technical Support for Computer Technologies. This question asked respondents to indicate whether or not their institutions provide adequate technical support for computer technologies. Only slightly over half of the respondents (52%, n=58) agreed (M=2.57) that their institutions provide adequate technical support (see Table 34).

Table 34. The number of Radiologic Technology faculty reporting institutional provision of adequate technical support when using computer technologies

Technical Support	Frequency	Percent
SD	17	15
D	36	32
A	36	32
SA	22	20
Total	111	100

To summarize: Overall, respondents indicated that their institutions encourage and support the use of traditional technologies. Respondents also generally agreed that their institutions encourage the use of computer technologies. Slightly over half (52%) agreed that adequate technical support is provided. A majority of respondents (89%) have also participated in training sessions. A majority (68%) agreed that their institutions offer adequate training sessions; 57% agreed that training session times are not convenient, and 50% agreed that they have time to participate.

Research Objective 5: To determine if a relationship exists between faculty characteristics and attitudes concerning distance education.

This objective addressed the relationship between the following variables: (a) dependent variables-academic position (POSITION), years as a Radiologic Technology instructor (YEARS), educational level (LEVEL), age (AGE), and gender (GENDER); and, (b) independent variables-familiarity with distance education (DEFAM) and offering of distance education (DEOFF). As discussed in Chapter 3, DEOFF and DEFAM resulted from exploratory factor analysis. The DEFAM questions focused on the respondent's familiarity with the concept of distance education; questions asked respondents about the effectiveness and logistics of distance education. DEOFF questions focused on the respondents' knowledge of their institutions involvement with distance education, as well as the respondents' willingness to offer distance education programs.

The survey asked the respondents to mark their responses on a scale of 1 to 4 (1=strongly disagree to 4=strongly agree). All relationships were analyzed using SAS version 6.12. T-tests and One-Way Analysis of Variance (ANOVA) were performed. The alpha level was set at $p<.05$.

Faculty Characteristics and Familiarity with Distance Education. Results revealed that the relationship between each faculty characteristic (POSITION, GENDER, YEARS, LEVEL, AGE) and DEFAM was not significant at $p<.05$ (see Tables 35-39).

Table 35. T-test for significant differences between familiarity with distance education and the Radiologic Technology faculty's academic position

POSITION	n	Mean	SD	SE	df	t	p
Didactic	91	2.63	0.52	0.05	102	-1.11	0.27
Clinical	13	2.80	0.59	0.16			
Total	104						

Table 36. T-test for significant differences between familiarity with distance education and the Radiologic Technology faculty's gender

GENDER	n	Mean	SD	SE	df	t	p
Male	36	2.60	0.58	0.10	105	-0.57	0.57
Female	71	2.67	0.50	0.06			
Total	107						

Table 37. Analysis of Variance for significant differences between familiarity with distance education and years as a Radiologic Technology instructor

Source	df	SS	MS	F	p
YEARS	29	7.63	0.26	0.93	0.57
error	75	21.23	0.28		

YEARS	N	M	SD
1-5	16	2.61	0.28
6-10	30	2.84	0.54
11-15	19	2.59	0.46
16-20	19	2.53	0.40
21-25	13	2.51	0.71
>25	8	3.87	0.37
Total	105		

Table 38. Analysis of Variance for significant differences between familiarity with distance education and the Radiologic Technology faculty's educational level

Source	df	SS	MS	F	p
LEVEL	4	0.75	0.19	0.67	0.61
error	102	28.53	0.28		

LEVEL	N	M	SD
Certificate	4	2.70	0.48
Associate	11	2.78	0.50
Bachelor	32	2.71	0.42
Master	59	2.58	0.58
Doctorate	1	3.00	0.00
Total	107		

Table 39. Analysis of Variance for significant differences between familiarity with distance education and the Radiologic Technology faculty's age

Source	df	SS	MS	F	p
AGE	6	2.92	0.49	1.85	0.10
error	100	26.35	0.26		

AGE	N	M	SD
26-30	4	3.08	0.71
31-35	8	2.94	0.35
36-40	14	2.80	0.57
41-45	28	2.66	0.39
46-50	32	2.58	0.55
51-55	14	2.40	0.63
56+	7	2.50	0.42
Total	107		

To summarize: no faculty characteristics were found to be significant at $p<.05$ in regards to DEFAM.

Faculty Characteristics and Offering Distance Education. Results revealed that the relationship between each faculty characteristic (POSITION, GENDER, YEARS, LEVEL, AGE) and DEOFF was not significant at $p<.05$ (see Tables 40-44).

Table 40. T-test for significant differences between offering distance education and the Radiologic Technology faculty's academic position

POSITION	n	Mean	SD	SE	df	t	p
Didactic	92	3.01	0.62	0.06	105	-0.70	0.48
Clinical	15	3.12	0.46	0.12			
Total	107						

Table 41. T-test for significant differences between offering distance education and the Radiologic Technology faculty's gender

GENDER	n	Mean	SD	SE	df	t	p
Male	36	3.07	0.58	0.09	108	0.70	0.48
Female	74	2.99	0.61	0.07			
Total	110						

Table 42. Analysis of Variance for significant differences between offering distance education and years as a Radiologic Technology instructor

Source	df	SS	MS	F	p
YEARS	29	10.92	0.38	1.06	0.41
error	78	27.82	0.36		

YEARS	N	M	SD
1-5	17	2.86	0.66
6-10	31	3.21	0.56
11-15	19	2.98	0.47
16-20	19	3.01	0.53
21-25	14	2.78	0.58
>25	8	3.13	0.90
Total	108		

Table 43. Analysis of Variance for significant differences between offering distance education and the Radiologic Technology faculty's educational level

Source	df	SS	MS	F	p
LEVEL	4	2.07	0.52	1.47	0.21
error	105	36.78	0.35		

LEVEL	N	M	SD
Certificate	5	3.40	0.68
Associate	11	2.92	0.54
Bachelor	33	2.93	0.62
Master	60	3.03	0.58
Doctorate	1	4.00	0.00
Total	110		

Table 44. Analysis of Variance for significant differences between offering distance education and the Radiologic Technology faculty's age

Source	df	SS	MS	F	p
AGE	6	1.46	0.24	0.67	0.67
error	103	37.38	0.36		

AGE	N	M	SD
26-30	4	3.25	1.50
31-35	8	3.29	0.59
36-40	14	3.14	0.67
41-45	29	3.00	0.42
46-50	33	2.91	0.57
51-55	14	3.02	0.48
56+	8	2.95	0.78
Total	110		

To summarize: no faculty characteristics were found to be significant at $p<.05$ in regards to DEOFF.

Research Objective 6: To document information regarding distance education training and distance education compensation.

Eleven survey questions were oriented towards gathering factual information rather than attitudinal information. Questions elicited information about distance education training and compensation for offering distance education programs. Responses ranged from 1 to 4 (1=strongly disagree to 4=strongly agree).

Distance Education Training. This question asked respondents to indicate whether or not their institutions offer adequate distance education training. A majority (71%, n=68) indicated (M=2.88) that their institutions do not offer adequate training (see Table 45).

Table 45. The number of Radiologic Technology faculty reporting on the existence of adequate institutional distance education training

Training	Frequency	Percent
SD	21	22
D	47	49
A	23	24
SA	5	5
Total	96	100

Distance Education Training Sessions. This question asked respondents whether or not training sessions were offered during convenient times. A majority (59%, n=40) agreed (M=2.43) that times are not convenient (see Table 46).

Table 46. The number of Radiologic Technology faculty indicating the inconvenience of distance education training times

Training Time	Frequency	Percent
SD	3	4
D	25	37
A	38	56
SA	2	3
Total	68	100

Technical Support for Distance Education. Respondents were asked whether or not their institutions provide adequate technical support for instructors who offer distance education programs. Fifty-one percent (n=39) agreed (M=2.46) that not enough technical support is provided (see Table 47).

Table 47. The number of Radiologic Technology faculty indicating the lack of institutional distance education support

Support	Frequency	Percent
SD	10	13
D	27	36
A	33	43
SA	6	8
Total	76	100

Comfort with Distance Education Technology. This question asked respondents if they are comfortable using the technology necessary to conduct distance education programs. A majority (72%, n=66) indicated (M=3.01) that they do not feel comfortable with the technology (see Table 48).

Table 48. The number of Radiologic Technology faculty indicating their comfort with using the technology necessary for distance education

Comfort	Frequency	Percent
SD	33	36
D	33	36
A	22	24
SA	5	6
Total	93	100

Training Time for Distance Education. Respondents were asked if they felt they had the time to participate in distance education training. Forty-four respondents (50%, n=45) agreed (M=2.40) that they do not have time to participate in training (see Table 49).

Table 49. The number of Radiologic Technology faculty indicating the lack of time for distance education training

Training Time	Frequency	Percent
SD	12	14
D	33	37
A	40	45
SA	4	5
Total	89	100

Participation in Distance Education Training. This question asked respondents to indicate whether or not they have participated in a distance education training session. A majority (56%, n=60) agreed that they have not participated (see Table 50). The mean for this variable was 2.71.

Table 50. The number of Radiologic Technology faculty indicating that they have not participated in a distance education training session

Participation	Frequency	Percent
SD	13	12
D	36	33
A	30	28
SA	30	28
Total	109	100

To summarize distance education training: A majority (71%) of the respondents indicated that their institutions do not offer adequate distance education training, and that training times are not convenient (59%). More than half (56%) of the respondents have participated in a training session. About half of the respondents indicated that they do not have time to participate in a training session and that there is a lack of adequate technical support. Lastly, a majority (72%) reported not being comfortable with the technology necessary to conduct distance education programs.

Distance Education Compensation. Respondents were asked whether or not their institutions provide compensations for offering distance education programs. A majority (74%, n=65) indicated (M=2.01) that no compensations are provided (see Table 51).

Table 51. The number of Radiologic Technolgy faculty indicating institutional provision of distance education compensation

Compensation	Frequency	Percent
SD	23	26
D	42	48
A	20	23
SA	2	2
Total	87	100

Expected Compensation for Conducting Distance Education Programs. When asked whether or not institutions should provide additional compensations for individuals who provide continuing professional education programs through distance education, a majority (97%, n=101) agreed (M=3.46) that compensations are necessary (see Table 52).

Table 52. The number of Radiologic Technology faculty indicating the institutional obligation to provide distance education compensation

Obligation	Frequency	Percent
SD	1	1
D	3	3
A	50	48
SA	51	49
Total	105	100

Expectation to Offer Distance Education Programs Without Compensation. Respondents where asked if community colleges should expect faculty members to offer continuing professional education programs through distance education without any form of compensation. A majority (87%, n=87) indicated (M=1.74) that community colleges should not expect this of their faculty members (see Table 53).

Table 53. The number of Radiologic Technology faculty indicating whether institutions should expect faculty members to offer distance education

Expectation	Frequency	Percent
SD	39	39
D	48	48
A	13	13
SA	1	1
Total	101	100

Interest in Providing Distance Education Programs Regardless of Compensation.

Regardless of compensation, a majority (74%, n=70) of the respondents agreed (M=2.89) that they are not interested in offering continuing professional education programs to area hospital radiographers through distance education (see Table 54).

Table 54. The number of Radiologic Technology faculty not willing to provide distance education programs regardless of compensation

Interest	Frequency	Percent
SD	6	6
D	18	19
A	50	53
SA	20	21
Total	94	100

Encouragement to Offer Distance Education Programs. Respondents were asked whether or not compensation would encourage faculty members to offer continuing professional education programs through distance education. The majority (89%, n=87) agreed (M=3.20) that compensation would encourage faculty members (see Table 55).

Table 55. The number of Radiologic Technology faculty indicating that compensation would encourage faculty members to offer distance education programs

Encouragement	Frequency	Percent
SD	4	4
D	7	7
A	61	62
SA	26	27
Total	98	100

To summarize compensation for distance education: A majority (74%) of respondents indicated that their institutions do not provide compensations as incentives for offering distance education programs. Eighty-nine percent indicated that compensation would encourage Radiologic Technology instructors to offer continuing professional education through distance education, and 97% indicated that they should be compensated. However, 74% indicated that, regardless of compensation, they are not interested in offering distance education programs. Lastly, 87% reported that community colleges should not expect Radiologic Technology faculty to offer distance education programs as a part of their job descriptions.

Research Objective 7: To determine if a relationship exists between faculty characteristics and attitudes concerning continuing professional education (CPE).

This objective addressed the relationship between the following variables: (a) dependent variables-academic position (POSITION), years as a Radiologic Technology instructor (YEARS), educational level (LEVEL), age (AGE), and gender (GENDER); and, (b) independent variables-purpose of continuing professional education (CEPURP), participation in continuing professional education (CEPART), and offering continuing professional education (CEOFF). As discussed in Chapter 3, CEPURP, CEPART, and CEOFF resulted from exploratory factor analysis. The CEPURP questions focused on the purpose of CPE (i.e., to promote professionalism, skill development, application of new information, and quality patient care). CEPART questions addressed reasons for participating in CPE (i.e., for enjoyment, stimulation, job motivation and performance, to feel secure about knowledge and skills, and to meet credit requirements). Lastly, CEOFF questions focused on the respondent's willingness to offer CPE programs (i.e., Radiologic Technology faculty members willingness to offer CPE programs freely versus offering CPE as a college obligation or community expectation).

The survey asked the respondents to mark their responses on a scale of 1 to 4 (1=strongly disagree to 4=strongly agree). All relationships were analyzed using SAS version 6.12. T-tests and One-Way Analysis of Variance (ANOVA) were performed. The alpha level was set at $p<.05$.

Faculty Characteristics and Purpose of Continuing Professional Education. Results revealed that GENDER was the only faculty characteristic found to be significant ($t=-2.08$, $p<.04$) in regards to CEPURP at $p<.05$ (see Tables 56-60). The difference between females ($M=3.24$) and males ($M=2.93$) was found to be statistically significant; female Radiologic Technology faculty reported more positive attitudes towards the purpose of continuing professional education. In other words, females more positively indicated that the purposes of

continuing professional education are to increase the quality of patient, promote professionalism, and provide opportunities for the acquisition and application of new knowledge and skills.

Table 56. T-test for significant differences between the purpose of continuing professional education and the Radiologic Technology faculty's academic position

POSITION	n	Mean	SD	SE	df	t	p
Didactic	92	3.12	0.70	0.07	23	-0.66	0.51
Clinical	13	3.21	0.42	0.12			
Total	105						

Table 57. T-test for significant differences between the purpose of continuing professional education and the Radiologic Technology faculty's gender

GENDER	n	Mean	SD	SE	df	t	p
Male	35	2.93	0.77	0.13	54	-2.08	0.04*
Female	73	3.24	0.59	0.06			
Total	108						

Note. * $p < .05$.

Table 58. Analysis of Variance for significant differences between the purpose of continuing professional education and years as a Radiologic Technology instructor

Source	df	SS	MS	F	p
YEARS	30	9.67	0.32	0.65	0.90
error	75	37.14	0.50		

YEARS	N	M	SD
1-5	17	3.10	0.72
6-10	29	3.26	0.55
11-15	18	3.00	0.69
16-20	19	2.98	0.62
21-25	14	3.14	0.67
>25	9	3.47	0.56
Total	106		

Table 59. Analysis of Variance for significant differences between the purpose of continuing professional education and the Radiologic Technology faculty's educational level

Source	df	SS	MS	F	p
LEVEL	4	1.80	0.45	1.03	0.40
error	102	44.55	0.44		

LEVEL	N	M	SD
Certificate	5	3.45	0.27
Associate	10	3.18	0.33
Bachelor	31	2.95	0.86
Master	60	3.18	0.60
Doctorate	1	3.50	0.00
Total	107		

Table 60. Analysis of Variance for significant differences between the purpose of continuing professional education and the Radiologic Technology faculty's age

Source	df	SS	MS	F	p
AGE	6	3.52	0.59	1.36	0.24
error	101	43.57	0.43		

AGE	N	M	SD
26-30	4	2.81	1.28
31-35	8	3.59	0.42
36-40	14	2.93	0.58
41-45	29	3.18	0.63
46-50	30	3.03	0.74
51-55	14	3.28	0.61
56+	9	3.25	0.35
Total	108		

To summarize: GENDER was the only faculty characteristic found to be significant at $p<.05$ in regards to CEPURP. Females reported more positive attitudes towards the purpose of continuing professional education.

Faculty Characteristics and Participation in Continuing Professional Education. Results revealed that GENDER was the only faculty characteristic found to be significant ($t=-2.99$, $p<.004$) in regards to CEPART at $p<.05$ (see Tables 61-65). The difference between females ($M=3.38$) and males ($M=3.15$) was found to be statistically significant; female Radiologic Technology faculty reported more positive attitudes towards participating in continuing

professional education. In other words, females were more agreeable that participating in continuing professional education activities is for enjoyment, stimulation, job motivation and performance, to feel secure about knowledge and skills, and to meet credit requirements.

Table 61. T-test for significant differences between participation in continuing professional education and the Radiologic Technology faculty's academic position

POSITION	n	Mean	SD	SE	df	t	p
Didactic	93	3.31	0.39	0.04	106	0.72	0.47
Clinical	15	3.23	0.40	0.10			
Total	108						

Table 62. T-test for significant differences between participation in continuing professional education and the Radiologic Technology faculty's gender

GENDER	n	Mean	SD	SE	df	t	p
Male	36	3.15	0.37	0.06	109	-2.99	0.004*
Female	75	3.38	0.38	0.04			
Total	111						

Note. * $p < .05$.

Table 63. Analysis of Variance for significant differences between participation in continuing professional education and years as a Radiologic Technology instructor

Source	df	SS	MS	F	p
YEARS	30	3.28	0.11	0.63	0.92
error	78	13.58	0.17		

YEARS	N	M	SD
1-5	17	3.18	0.51
6-10	31	3.37	0.39
11-15	19	3.37	0.47
16-20	19	3.11	0.37
21-25	14	3.38	0.37
>25	9	3.39	0.14
Total	109		

Table 64. Analysis of Variance for significant differences between participation in continuing professional education and the Radiologic Technology faculty's educational level

Source	df	SS	MS	F	p
LEVEL	4	0.70	0.18	1.14	0.34
error	105	16.24	0.15		

LEVEL	N	M	SD
Certificate	5	3.43	0.47
Associate	11	3.09	0.31
Bachelor	33	3.27	0.46
Master	60	3.35	0.36
Doctorate	1	3.27	0.00
Total	110		

Table 65. Analysis of Variance for significant differences between participation in continuing professional education and the Radiologic Technology faculty's age

Source	df	SS	MS	F	p
AGE	6	0.64	0.11	0.68	0.67
error	104	16.33	0.16		

AGE	N	M	SD
26-30	4	3.20	0.51
31-35	8	3.51	0.37
36-40	14	3.22	0.46
41-45	29	3.29	0.36
46-50	33	3.27	0.41
51-55	14	3.30	0.40
56+	9	3.42	0.32
Total	111		

To summarize: GENDER was the only faculty characteristic found to be significant at $p<.05$ in regards to CEPART. Females reported more positive attitudes towards participating in continuing professional education activities.

Faculty Characteristics and Offering Continuing Professional Education. Results revealed that GENDER was the only faculty characteristic found to be significant ($t=2.16$, $p<.03$) in regards to CEOFF at $p<.05$ (see Tables 66-70). The difference between males ($M=2.84$) and females ($M=2.58$) was found to be statistically significant; male Radiologic Technology faculty reported less disagreeable attitudes towards offering continuing professional education programs. In other words, males are more likely than females to offer continuing professional education programs; the males are also less disagreeable in believing that the community college should

provide some means of offering CPE to area radiographers, and in believing that Radiologic Technology instructors should be asked to offer CPE in addition to their regular workloads. Lastly, the males reported less disagreement concerning expectations to offer continuing professional education. In other words, males are more likely than females to hold the attitude that radiographers who work in area hospitals should expect faculty members to offer CPE programs.

Table 66. T-test for significant differences between offering continuing professional education and the Radiologic Technology faculty's academic position

POSITION	n	Mean	SD	SE	df	t	p
Didactic	92	2.66	0.64	0.07	105	-0.67	0.50
Clinical	15	2.77	0.48	0.12			
Total	107						

Table 67. T-test for significant differences between offering continuing professional education and the Radiologic Technology faculty's gender

GENDER	n	Mean	SD	SE	df	t	p
Male	36	2.84	0.54	0.09	108	2.16	0.03*
Female	74	2.58	0.63	0.07			
Total	110						

Note. * $p < .05$.

Table 68. Analysis of Variance for significant differences between offering continuing professional education and years as a Radiologic Technology instructor

Source	df	SS	MS	F	p
YEARS	30	7.28	0.24	0.57	0.96
error	77	32.72	0.42		

YEARS	N	M	SD
1-5	17	2.55	0.63
6-10	31	2.80	0.73
11-15	18	2.80	0.54
16-20	19	2.62	0.48
21-25	14	2.48	0.71
>25	9	2.67	0.28
Total	108		

Table 69. Analysis of Variance for significant differences between offering continuing professional education and the Radiologic Technology faculty's educational level

Source	df	SS	MS	F	p
LEVEL	4	0.48	0.12	0.31	0.87
error	104	39.97	0.38		

LEVEL	N	M	SD
Certificate	5	2.72	0.53
Associate	11	2.70	0.54
Bachelor	33	2.57	0.70
Master	59	2.72	0.59
Doctorate	1	2.50	0.00
Total	109		

Table 70. Analysis of Variance for significant differences between offering continuing professional education and the Radiologic Technology faculty's age

Source	df	SS	MS	F	p
AGE	6	4.09	0.68	1.93	0.08
error	103	36.39	0.35		

AGE	N	M	SD
26-30	4	2.38	1.11
31-35	8	2.56	0.50
36-40	14	3.07	0.55
41-45	28	2.79	0.54
46-50	33	2.56	0.64
51-55	14	2.46	0.47
56+	9	2.60	0.63
Total	110		

To summarize: GENDER was the only faculty characteristic found to be significant at $p<.05$ in regards to CEOFF. Males reported less negative attitudes towards offering continuing professional education programs.

Research Objective 8: To document the number of Radiologic Technology programs that have joined partnerships with area hospitals and to identify the number of programs that are offered per year.

This objective sought to identify how many Radiologic Technology programs have linked with area hospitals to provide radiographers continuing professional education programs through distance education (see Table 71). In addition, if partnerships have been formed, this objective identified how many programs are offered per year (see Table 72). A majority (89%,

n=101) of the respondents indicated that their Radiologic Technology programs do not have distance education partnerships with area hospitals. Ten respondents indicated the number of programs that their departments offer per year.

Table 71. The number of community college Radiologic Technology programs who have formed partnerships with area hospitals through distance education

Partnership	Frequency	Percent
Yes	12	11
No	101	89
Total	113	100

Table 72. The number of yearly programs offered by Radiologic Technology programs through distance education

Programs	Frequency	Percent
1	2	20
2	2	20
3	1	10
4	1	10
5	1	10
12	1	10
15	1	10
46	1	10
Total	10	100

Research Objective 9: To document whether or not Radiologic Technology faculty provide continuing professional education programs for radiographers in area hospitals.

This objective asked respondents to indicate whether or not their Radiologic Technology programs provide any type of continuing professional education to area radiographers (i.e., loan video tapes, lecture series) (see Table 73). A majority (64%, n=73) reported that they do offer some form of continuing professional education.

Table 73. The number of Radiologic Technology faculty indicating whether or not their department offers continuing professional education programs to radiographers at area hospitals.

Programs	Frequency	Percent
Yes	73	64
No	42	37
Total	115	100

Research Objective 10: To document how and how often Radiologic Technology programs provide continuing professional education programs for radiographers in area hospitals.

This objective was presented as two open-ended questions that asked respondents to identify how their departments offer continuing professional education programs (i.e., loan video tapes, lecture series) as well as to report how often such programs are provided.

Lectures were frequently cited as the means by which Radiologic Technology faculty members provide continuing professional education to area radiographers. Faculty indicated that lectures are given anywhere from once a year to six times a year. Seminars and workshops were reported as being offered one to four times a year. Video loans were also frequently cited; faculty indicated that videos were loaned anywhere from once a month to continuously (as requested by radiographers). One-day weekend seminars as well as weekend seminars were reported as being

offered once to twice a year. Courses in advanced modalities were reported as being offered every semester. In addition, faculty also reported providing computer-assisted instruction for radiographers as well as loaning continuing professional education booklets on a continuous basis.

Summary

A majority of the surveyed Radiologic Technology instructors are female, between the ages of 41-50, hold a Masters Degree, and have worked as an instructor for 11 or more years. In addition, a majority of the instructors reported didactic responsibilities as their primary area of concentration.

As for instructional technology, faculty indicated that they possess the highest level of knowledge about and experience with the traditional technologies. Of the traditional technologies, faculty knowledge about and experience with slides ranked highest followed by transparencies, video, and audio. Word processing knowledge and experience ranked highest among the computer technologies. Most of the responding faculty members possess average to above average word processing knowledge and experience. Average to above average knowledge about and experience with e-mail, the internet, CD-ROMs, CAI, presentation software, and spreadsheets were also indicated. Conferencing technologies ranked lowest among faculty members. More than half of the faculty members reported no to little knowledge about and experience with these technologies.

When the relationship between faculty characteristics and traditional technologies was analyzed, no characteristics were found to be significant. In addition, no faculty characteristics were found to be significant in regards to computer technologies.

When familiarity with the term distance education was analyzed with respect to faculty characteristics, the results revealed no significant characteristics. In addition, no faculty characteristics were found to be significant in regards to offering distance education programs.

As for distance education training, a majority of the respondents indicated that their institutions do not offer adequate distance education training, and that training times are not convenient. More than one-half of the respondents have participated in a training session. About half of the respondents indicated that they do not have time to participate in a training session and that there is a lack of adequate technical support. Lastly, a majority also reported not being comfortable with the technology necessary to conduct distance education programs.

When faculty members were asked about compensation for providing distance education programs a majority of them indicated that their institutions do not provide compensations as incentives for offering such programs. A majority of the faculty indicated that compensation would encourage and should be used to encourage Radiologic Technology instructors to offer continuing professional education programs through distance education. However, a majority indicated that, regardless of compensation, they are not interested in offering distance education programs. Lastly, a majority of the faculty reported that community colleges should not expect Radiologic Technology faculty to offer distance education programs as a part of their job descriptions.

Faculty members were surveyed regarding their attitudes towards the purpose of continuing professional education; gender was the only faculty characteristic found to be significant. Female Radiologic Technology faculty reported more positive attitudes towards the purpose of continuing professional education. In other words, females more positively indicated that the purposes of continuing professional education are to increase the quality of patient, promote professionalism, and provide opportunities for the acquisition and application of new knowledge and skills.

Gender was the only faculty characteristic found to be significant in regards to participation in continuing professional education programs. Female Radiologic Technology faculty reported more positive attitudes towards participating in continuing professional education. In other words, females were more agreeable that participating in continuing

professional education activities is for enjoyment, stimulation, job motivation and performance, to feel secure about knowledge and skills, and to meet credit requirements.

Lastly, gender was the only faculty characteristic found to be significant in regards to offering continuing professional education programs. Male Radiologic Technology faculty reported less disagreeable attitudes towards offering continuing professional education programs. In other words, males are more likely than females to offer continuing professional education programs; the males are also less disagreeable in believing that the community college should provide some means of offering CPE to area radiographers, and in believing that Radiologic Technology instructors should be asked to offer CPE in addition to their regular workloads. Lastly, the males reported less disagreement concerning expectations to offer continuing professional education. In other words, males are more likely than females to hold the attitude that radiographers who work in area hospitals should expect faculty members to offer CPE programs.

A majority of the respondents indicated that they do not offer continuing professional education programs via distance education. However, a majority did indicate that some form of continuing professional education was provided. Various means by which continuing professional education programs are offered include: lectures, seminars, workshops, video loans, advance level courses, computer-assisted instruction, and loaning continuing professional education booklets. How often such programs are provided varied anywhere from once a year to a continuous basis.

Chapter V

Summary, Conclusions, and Recommendations

The purpose of this study was to determine the existence of integrated facilities as well as to determine community college Radiologic Technology faculty attitudes towards instructional technology, distance education, and continuing professional education. The survey method was utilized for gathering this information; 115 of 123 surveys were included in the analysis. This represented a 93% response rate.

This chapter restates each research objective along with its summary and conclusions. Implications and recommendations for future research are provided at the end of this chapter.

Research Objective 1: To provide a demographic profile of community college Radiologic Technology faculty.

This objective addressed the demographic characteristics including academic position, years as a Radiologic Technology instructor, educational level, age, and gender.

Summary and Conclusions. A majority of the respondents are didactic instructors, female, between the ages of 41-50, hold a Master's Degree, and have worked as a Radiologic Technology instructor for 11 or more years.

Research Objective 2: To document various forms of instructional technologies faculty have knowledge about and/or experience using.

This objective addressed faculty knowledge about and/or experience with the following instructional technologies: (a) traditional technologies - audio, video, slides, and transparencies; (b) computer technologies - word processing, spreadsheets, CD-ROM, internet, e-mail, computer-assisted instruction, and presentation software; and (c) conferencing technologies - one-way audio/one-way video, two-way audio/one-way video, and two-way audio/two-way video. Responses for these questions ranged from 1=not knowledgeable/not experienced to 5=very knowledgeable/very experienced.

Summary and Conclusions. Faculty members reported higher levels of knowledge about and experience with traditional technologies and computer technologies than with conferencing technologies. All faculty members reported average to above average knowledge about videos, slides, and transparencies; also, a majority of faculty members reported average to above average knowledge about audio technology (cassettes). Average to above average experience with the traditional technologies was reported by either all faculty members or a majority of the faculty members for slides, video, audio, and transparencies.

Faculty members also indicated average to high levels of knowledge about and experience with the computer technologies. Word processing and e-mail had the highest reportings of average to above average knowledge followed by the internet, CD-ROMs, CAI, presentation software, and spreadsheets. A majority of faculty members also reported average to above average experience with these technologies. Word processing ranked first followed by e-mail, the internet, CD-ROMs, CAI, presentation software, and spreadsheets.

The conferencing technologies ranked below both traditional and computer technologies in regards to knowledge and experience. Less than one-half reported average to above average knowledge about one-way audio/one-way video, two-way audio/one-way video, and two-way audio/two-way video. Low levels of experience with these technologies were also reported.

When asked to report about "other" technologies, a majority of the faculty indicated that they possess no to little knowledge about technologies other than those addressed in the survey. A majority also indicated no to little experience with other technologies.

These findings are consistent with the literature review. The literature review revealed that most faculty members possess good to expert knowledge about and experience with the traditional technologies and word processing; less knowledge and experience was noted for the other computer technologies as well as for the conferencing technologies (Heath, 1996; Spotts & Bowman, 1995).

Traditional technologies have been around longer than computer technologies and conferencing technologies. Therefore, it is not surprising that faculty members are more knowledgeable about and experienced with using audio, video, slides, and transparencies versus CAI, CD-ROMs, and presentation software, for example. As faculty members become more knowledgeable about various types of technologies, perhaps their willingness to implement them in the classroom will increase.

Research Objective 3: To determine if a relationship exists between faculty characteristics and attitudes concerning various forms of instructional technology.

This objective addressed the relationship between the following variables: (a) dependent variables-academic position, years as a Radiologic Technology instructor, educational level, age, and gender; and, (b) independent variables-traditional technologies, and computer technologies. As discussed in Chapter 3, the traditional technologies variable and the computer technologies variable resulted from exploratory factor analysis. The traditional technologies variable includes the following technologies: audio, video, slides, and transparencies. The computer technologies variable includes the following technologies: word processing, spreadsheets, CD-ROM, internet, e-mail, computer-assisted instruction, and presentation software. The survey questions asked the respondents to indicate on a scale of 1 to 4 (1=strongly disagree to 4=strongly agree) the *importance*, *convenience*, and *ease of use* of these various technologies.

Summary and Conclusions. No faculty characteristics were found to be significant in regards to traditional technologies. Likewise, no faculty characteristics were found to be significant in regards to computer technologies.

A review of the literature revealed a departure of these results from Heath's 1996 research. Heath's study indicated that as age and years of experience increased, favorable attitudes towards instructional technology decreased. One likely explanation could be attributed to the group that was surveyed. The aforementioned study surveyed university faculty, whereas,

this researcher surveyed a specific population (Radiologic Technology faculty) from 100 community colleges.

As for gender, the results from this study depart somewhat from those of Spotts and Bowman (1995) and Heath (1996). Spotts and Bowman (1995) found no significant differences between gender with regards to older technologies. Males, however, were found to possess a higher level of knowledge with the computer technologies. In addition, Heath (1996) found that females possess more favorable attitudes towards instructional technologies than the males.

Research Objective 4: To document information regarding instructional technology training.

Eight survey questions were oriented towards gathering factual information rather than attitudinal information. Questions elicited information about institutional encouragement, support, and training for instructional technologies. Responses ranged from 1 to 4 (1=strongly disagree to 4=strongly agree).

Summary and Conclusions. Faculty members generally agreed that institutional encouragement and support was provided for those using traditional technologies and computer technologies. A majority of the respondents agreed that adequate training sessions were offered by their institutions, and they indicated having participated in a training session. A majority of the faculty reported that training times are convenient, and about one-half indicated they have time to participate.

These findings are consistent with the technological surge that has occurred in educational institutions nationwide. In order to keep abreast of the skills needed to implement new technologies (i.e, computer technologies and conferencing technologies), community colleges nationwide are taking an active role in providing training and support for their faculty members (Glenn & Carrier, 1989; Herring, Smaldino, & Thompson, 1995; Gooler, 1989; Sturdivant, 1989; Swalec, 1993). According to these individuals, this active role needs to remain on-going and up-dated. That is, training must not be sporadic and obsolete; otherwise, training

becomes a barrier to successful instructional technology implementation. In addition, this training must be convenient. Although results from this research revealed that a majority of faculty have participated in training sessions, only a little over the majority of them agreed that training times are convenient.

Research Objective 5: To determine if a relationship exists between faculty characteristics and attitudes concerning distance education.

This objective addressed the relationship between the following variables: (a) dependent variables-academic position, years as a Radiologic Technology instructor, educational level, age, and gender; and, (b) independent variables-familiarity with distance education and offering of distance education. As discussed in Chapter 3, these variables resulted from exploratory factor analysis. The familiarity with distance education questions focused on the respondent's familiarity with the concept of distance education. Questions asked respondents about the effectiveness and logistics of distance education. The offering of distance education questions focused on the respondent's knowledge of their institutions involvement with distance education, as well as the respondents willingness to offer distance education programs. The survey asked the respondents to mark their responses on a scale of 1 to 4 (1=strongly disagree to 4=strongly agree).

Summary and Conclusions. No faculty characteristics were found to be significant in regards to familiarity with the concept of distance education.

These results parallel Clark's (1992) study reviewed in Chapter Two. Clark's study also revealed that attitudes towards familiarity with distance education were not significant in regards to age, gender, or years in one's current position. It must be noted that Clark's research, however, focused on university and two-year college faculty, whereas, this research focused on community college faculty.

As for attitudes towards offering distance education programs, no faculty characteristics were found to be significant.

Research Objective 6: To document information regarding distance education training and distance education compensation.

Eleven survey questions were oriented towards gathering factual information rather than attitudinal information. Questions elicited information about distance education training and compensation for offering distance education programs. Responses ranged from 1 to 4 (1=strongly disagree to 4=strongly agree).

Summary and Conclusions. A majority of the respondents indicated that their institutions do not offer adequate distance education training and that training times are not convenient. More than half of the respondents have not participated in a training session. About half of the respondents also indicated that they do not have time to participate in a training session and that there is a lack of adequate technical support. Lastly, a majority reported not being comfortable with the technology necessary to conduct distance education programs.

A majority of respondents indicated that their institutions do not provide compensations as incentives for offering distance education programs. A majority indicated that compensation would encourage Radiologic Technology instructors to offer continuing professional education through distance education, and they also indicated that they should be compensated. However, a majority indicated that, regardless of compensation, they are not interested in offering distance education programs. Lastly, a majority of the faculty reported that community colleges should not expect Radiologic Technology faculty to offer distance education programs as a part of their job descriptions.

Overall, Radiologic Technology instructors indicated very little interest in offering distance education programs. Most faculty members indicated that they do not feel comfortable with the technologies (i.e., two-way audio/two-way video, etc.) used to implement distance education programs. This finding is consistent with the faculty's responses to Objective Two in regards to knowledge about and experience with conferencing technologies. A lack of knowledge

and experience with conferencing technologies could explain why Radiologic Technology faculty members may be reluctant to offer distance education programs.

As previously mentioned, a majority of the faculty members agreed that community colleges should not expect instructors to offer distance education programs as a part of their job descriptions. Such a concern could result from workload issues. All Radiologic Technology programs must follow certain course guidelines established by their accrediting body, the Joint Review Committee on Education in Radiologic Technology. As a result of these guidelines, the Radiologic Technology curriculum is basically a full-time curriculum, both for students and for faculty. Didactic responsibilities, as well as clinical responsibilities, consume a lot of a Radiologic Technology instructor's time. Therefore, resistance could be met by faculty who are expected to provide additional services via distance education. The review of literature documented that workload concerns are barriers to implementing distance education programs.

Research Objective 7: To determine if a relationship exists between faculty characteristics and attitudes concerning continuing professional education.

This objective addressed the relationship between the following variables: (a) dependent variables-academic position, years as a Radiologic Technology instructor, educational level, age, and gender; and, (b) independent variables-purpose of continuing professional education, participation in continuing professional education, and offering continuing professional education. As discussed in Chapter 3, these variables resulted from exploratory factor analysis. Questions focused on the purpose of, reasons for participating in, and willingness to offer continuing professional education. The survey asked the respondents to mark their responses on a scale of 1 to 4 (1=strongly disagree to 4=strongly agree).

Summary and Conclusions. Gender was the only faculty characteristic found to be significant in regards to the purpose of continuing professional education. The difference between females and males was found to be statistically significant; female Radiologic Technology faculty reported more positive attitudes towards the purpose of continuing professional education. In

other words, females more positively indicated that the purposes of continuing professional education are to increase the quality of patient, promote professionalism, and provide opportunities for the acquisition and application of new knowledge and skills.

Gender was also found to be significant relative to participating in continuing professional education. The difference between females and males was found to be statistically significant; female Radiologic Technology faculty reported more positive attitudes towards participating in continuing professional education. In other words, females were more agreeable that participating in continuing professional education activities is for enjoyment, stimulation, job motivation and performance, to feel secure about knowledge and skills, and to meet credit requirements.

Lastly, gender was also the only faculty characteristic found to be significant in regards to offering continuing professional education programs. The difference between males and females was found to be statistically significant; male Radiologic Technology faculty reported less disagreeable attitudes towards offering continuing professional education programs. In other words, males are more likely than females to offer continuing professional education programs; the males are also less disagreeable in believing that the community college should provide some means of offering CPE to area radiographers, and in believing that Radiologic Technology instructors should be asked to offer CPE in addition to their regular workloads. Lastly, the males reported less disagreement concerning expectations to offer continuing professional education. In other words, males are more likely than females to hold the attitude that radiographers who work in area hospitals should expect faculty members to offer CPE programs.

Results from this study vary from those indicated in the literature review (Darkenwald & Hayes, 1986; Fung, 1994). This was anticipated by the researcher due to the population that was sampled as well as to the types of questions that the survey addressed. Although varying results were expected, the aforementioned studies provide general awareness of some of the potential factors that can affect participants' attitudes towards educational activities. An understanding of

what faculty characteristics lend themselves to more favorable attitudes may assist program planners in planning meaningful and effective programs.

Research Objective 8: To document the number of Radiologic Technology programs that have joined partnerships with area hospitals and to identify the number of programs that are offered per year.

This objective sought to identify how many Radiologic Technology programs have linked with area hospitals to provide radiographers continuing professional education programs through distance education. In addition, if partnerships have been formed, this objective identified how many programs are offered per year.

Summary and Conclusions. A majority of the respondents indicated that their Radiologic Technology programs do not have distance education partnerships with area hospitals. Ten respondents indicated that their department offers continuing professional education programs through distance education. Seven faculty members indicated that 1 - 5 programs are offered per year; one indicated that 46 programs are offered; one faculty reported that 12 programs were offered per year; and one respondent indicated that 15 programs are offered per year.

Due to the fact that several faculty members from each Radiologic Technology program completed the survey, it is impossible to determine how many Radiologic Technology programs offer CPE through distance education. In other words, for example, two faculty members from the same department may have indicated a different number of programs that are offered. Therefore, even though 10 faculty members responded to this question, it cannot be concluded that 10 institutions provide continuing professional education through distance education.

It can be concluded, however, that most Radiologic Technology programs do not offer continuing professional education programs through distance education. According to Doucette (1993), community colleges are leaders in the application of distance education for teaching and learning. Implementation of this technology may have a broad community college focus as opposed to a particular department's focus. That is, distance education may be used more for

general course offerings than for continuing professional education purposes within specific departments. Therefore, integrated facilities may exist at the college level, but not specifically at the department level.

Research Objective 9: To document whether or not Radiologic Technology faculty provide continuing professional education programs for radiographers in area hospitals.

This objective asked respondents to indicate whether or not their Radiologic Technology programs provide any type of continuing professional education to area radiographers (i.e., loan video tapes, lecture series).

Summary and Conclusions. A majority of the faculty reported that they do offer some form of continuing professional education. A majority of the Radiologic Technology programs are following the overall mission of the community college system by offering continuing professional education to external constituents.

Research Objective 10: To document how and how often Radiologic Technology programs provide continuing professional education programs for radiographers in area hospitals.

This objective asked respondents to identify how their departments offer continuing professional education programs (i.e., loan video tapes, lecture series) as well as to report how often such programs are provided.

Summary and Conclusions. Radiologic Technology faculty provide continuing professional education for area radiographers through the provision of lectures, seminars, workshops, advance seminar courses, weekend seminars, videos, booklets, and, computer-assisted instruction.

Whether or not Radiologic Technology faculty engage in providing continuing professional education for area radiographers will depend upon whether or not the faculty deems this as their responsibility and whether or not the community college mandates that faculty members provide this service.

Recommendations for Practice

Based upon the findings of this study, the following recommendations are offered:

1. Encourage and support faculty development in the use of instructional technology by purchasing and maintaining various types of instructional technologies.
2. Encourage and support faculty development in the use of distance education by purchasing and maintaining the technology required for this method of delivery.
3. Encourage and support faculty development in the use of instructional technology and distance education by offering training sessions in various formats (i.e., classes provided by the technical support group which could be offered during the day, evenings or weekends; self-directed training manuals and/or videos designed by the technical support group; provide monies designated specifically for faculty to attend off-site training programs).
4. Encourage and support faculty development in the use of instructional technology and distance education by providing on-going technical support.
5. Expand the concept of integrated facilities to the departmental level by providing incentives such as extra pay, time off, promotions, and/or recognition in order to encourage Radiologic Technology faculty to offer continuing professional education programs to area radiographers through the use of distance education.
6. Provide incentives such as extra pay, time off, promotions, and/or recognition in order to encourage Radiologic Technology faculty to offer continuing professional education programs to area radiographers by means other than that of distance education.

7. Full teaching loads, accompanied by clinical responsibilities, result in a lack of "spare time to assume the extra responsibility of planning continuing professional education programs. Therefore, in addition to the aforementioned incentives, responsibility for these programs could be shared between faculty members so that no one faculty bears the load.

Recommendations for Future Research

The following recommendations are suggested for future study based upon the findings of this study:

1. Replication of this study (on community college Radiologic Technology faculty) is suggested to refine the survey instrument as well as to substantiate the findings.
2. Continue to research Radiologic Technology faculty participation in the use of instructional technologies and distance education in order to assist community college administrators in determining training/support needs for these faculty.
3. Research the attitudes of community college administrators relative to the concept of integrated facilities. In addition, research could focus on the extent of the college's involvement. In other words, if a college is considered to be an integrated facility, are only a select number of faculty involved with the delivery of continuing professional education programs or can any faculty member choose to participate? Information gathered from this research could assist administration in creating a climate conducive (i.e., by providing on-going technical support, providing incentives for faculty members) for Radiologic Technology faculty members to participate in providing continuing professional education programs to area radiographers.
4. Research the attitudes of Radiologic Technology Program Directors relative to the tone they set for their faculty members regarding instructional technologies, distance education, and continuing professional education.

5. Research the attitudes of area Radiologic Technologists regarding the community colleges role in providing continuing professional educational programs.
6. Research faculty members from other community college allied health professions to determine whether or not the findings from this study could be generalized to other health occupations.
7. Research Radiologic Technology faculty members regarding formal education in instructional technology methodology.

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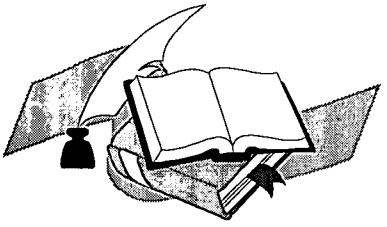
Appendix A

Survey Instrument

RADIOLOGIC TECHNOLOGY EDUCATOR SURVEY



I. **Respondent Characteristics**

Please respond to the following by marking an "X" in the appropriate space or writing in the information requested:

1. Which of the following best describes your employment status?
   ___ Full-Time
   ___ Part-Time
   If you answered "Part-Time", please return the uncompleted questionnaire in the enclosed self-addressed stamped envelope. Thank you.

2. What is your *primary* academic position?
   ___ Didactic Instructor
   ___ Clinical Instructor

3. How many years have you been a Radiologic Technology instructor?
   ___ years

4. What is your highest educational level?
   ___ Certificate
   ___ Associates Degree
   ___ Bachelors Degree
   ___ Masters Degree
   ___ Doctorate Degree

5. What is your age?
   ___ 20 - 25 years
   ___ 26 - 30 years
   ___ 31 - 35 years
   ___ 36 - 40 years
   ___ 41 - 45 years
   ___ 46 - 50 years
   ___ 51 - 55 years
   ___ 56+ years

6. What is your gender?
   ___ Male
   ___ Female

II. **Instructional Technology**

For the purposes of this survey, **instructional technology** refers to any technology (software and hardware) used in the teaching/learning process. The following definitions pertain to the questions in this section of the survey:

Audio: cassette tapes
Video: television, VCR tapes, video cameras
Slides: static pictures used in conjunction with a slide projector
Transparencies: used in conjunction with overhead projectors
Word Processing: software packages (i.e., *Microsoft* Word)
Computer Spreadsheets: software used to display information and perform mathematical computations such as calculating student grades (i.e., *Microsoft* Excel)
CD-ROM: compact disc of information used on a personal computer (i.e., encyclopedias stored on CD; medical dictionaries on CD); also used with special projectors in class
Internet: searching the World Wide Web for information on a variety of topics
E-Mail (Electronic Mail): a form of electronic communication where messages may be sent by an individual at one computer to an individual at another computer
Computer-Assisted Instruction: interactive computer programs that allow the student to learn skills and answer questions at his own pace
Presentation Software: computer generated screens used in conjunction with lectures (i.e., *Microsoft* Powerpoint)
One-Way Audio/One-Way Video: only the participants hear and see the provider (i.e., the session is taped by the provider and broadcast on TV)
Two-Way Audio/One-Way Video Conferencing: the provider and the participants are able to hear one another and engage in dialogue, but only the participants can actually see the provider
Two-Way Audio/Two-Way Video Conferencing: live video instruction with audio dialogue (i.e., students and instructor are at different locations, but can see and hear one another)

Please indicate your response by circling the number most appropriate for your degree of **knowledge** about the following **instructional technologies**:

	Not Knowledgeable				**Very Knowledgeable**
7. Audio	1	2	3	4	5
8. Video	1	2	3	4	5
9. Slides	1	2	3	4	5
10. Transparencies	1	2	3	4	5
11. Word Processing	1	2	3	4	5
12. Computer Spreadsheets	1	2	3	4	5
13. CD-ROM	1	2	3	4	5
14. Internet	1	2	3	4	5
15. E-Mail	1	2	3	4	5
16. Computer-Assisted Instruction	1	2	3	4	5
17. Presentation Software	1	2	3	4	5
18. One-Way Audio/One-Way Video	1	2	3	4	5
19. Two-Way Audio/One-Way Video	1	2	3	4	5
20. Two-Way Audio/Two-Way Video	1	2	3	4	5
21. Other	1	2	3	4	5

Please indicate your response by circling the number most appropriate for your degree of **experience** with the following **instructional technologies**:

	Not Experienced				**Very Experienced**
22. Audio	1	2	3	4	5
23. Video	1	2	3	4	5
24. Slides	1	2	3	4	5
25. Transparencies	1	2	3	4	5
26. Word Processing	1	2	3	4	5
27. Computer Spreadsheets	1	2	3	4	5
28. CD-ROM	1	2	3	4	5
29. Internet	1	2	3	4	5
30. E-Mail	1	2	3	4	5
31. Computer-Assisted Instruction	1	2	3	4	5
32. Presentation Software	1	2	3	4	5
33. One-Way Audio/One-Way Video	1	2	3	4	5
34. Two-Way Audio/One-Way Video	1	2	3	4	5
35. Two-Way Audio/Two-Way Video	1	2	3	4	5
36. Other	1	2	3	4	5

Please indicate your response by circling the number most appropriate for **your opinion** towards the following statements about various **instructional technologies**.
SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree, NS = Not Sure

37. Cassette tapes play an important role in classroom instruction.	SA	A	D	SD	NS
38. Cassette tapes are convenient to use.	SA	A	D	SD	NS
39. Cassette tapes are easy to use.	SA	A	D	SD	NS
40. Transparencies are an important media to use for presenting instructional material.	SA	A	D	SD	NS
41. Transparencies are convenient to use.	SA	A	D	SD	NS
42. Transparencies are easy to use.	SA	A	D	SD	NS
43. Videotapes serve an important role in conveying instructional material.	SA	A	D	SD	NS
44. Videotapes are convenient to use.	SA	A	D	SD	NS
45. Videotapes are easy to use.	SA	A	D	SD	NS
46. Slides are an important media to use for classroom instruction.	SA	A	D	SD	NS
47. Slides are convenient to use.	SA	A	D	SD	NS
48. Slides are easy to use.	SA	A	D	SD	NS
49. Word processing programs are important to use when preparing instructional materials.	SA	A	D	SD	NS

50. Word processing programs are convenient to use.	SA	A	D	SD	NS
51. Word processing programs are easy to use.	SA	A	D	SD	NS
52. Spreadsheets are important for making calculations such as student grades.	SA	A	D	SD	NS
53. Spreadsheets are convenient to use.	SA	A	D	SD	NS
54. Spreadsheets are easy to use.	SA	A	D	SD	NS
55. E-mail is an important tool to use for communicating with others.	SA	A	D	SD	NS
56. E-mail is convenient to use.	SA	A	D	SD	NS
57. E-mail is easy to use.	SA	A	D	SD	NS
58. The internet is an important tool that can aid in preparing classroom materials.	SA	A	D	SD	NS
59. The internet is convenient to use.	SA	A	D	SD	NS
60. The internet is easy to use.	SA	A	D	SD	NS
61. Computer-assisted instruction plays an important role in presenting instructional material.	SA	A	D	SD	NS
62. Computer-assisted instruction is convenient to use.	SA	A	D	SD	NS
63. Computer-assisted instruction is easy to use.	SA	A	D	SD	NS
64. Presentation software is an important tool for preparing instructional material.	SA	A	D	SD	NS
65. Presentation software is convenient to use.	SA	A	D	SD	NS
66. Presentation software is easy to use.	SA	A	D	SD	NS
67. CD-ROM discs are important to use when preparing instructional material.	SA	A	D	SD	NS
68. CD-ROM discs are convenient to use.	SA	A	D	SD	NS
69. CD-ROM discs are easy to use.	SA	A	D	SD	NS

70. My institution encourages instructors to use media such as slides, cassettes, videos, and transparencies.	SA	A	D	SD	NS
71. Using slides, cassettes, videos, and transparencies require little, if any technical support from my institution's media department.	SA	A	D	SD	NS
72. My institution encourages the use of computer applications.	SA	A	D	SD	NS
73. My institution provides adequate computer application training sessions.	SA	A	D	SD	NS
74. Computer application training sessions are offered during times that are not convenient for me.	SA	A	D	SD	NS
75. Computer application training sessions take more time than I have.	SA	A	D	SD	NS
76. I have participated in a computer applications training session.	SA	A	D	SD	NS
77. My institution has adequate technical support for instructors who use computer applications.	SA	A	D	SD	NS

III. **Distance Education**

For the purposes of this survey, **distance education** refers to any educational program where the provider and the participants are physically separated thereby requiring the implementation of various forms of media to deliver the program. Distance education programs may be carried out by One-Way Audio/One-Way Video,Two-Way Audio/One-Way Video, or Two-Way Audio/Two-Way Video (refer to definitions on page 2 of this survey). In addition, it must be noted that the instructional technologies listed on page 2 may be used in conjunction with the Two-Way Audio/One-Way Video and Two-Way Audio/Two-Way Video methods (i.e., the provider may show slides to participants at the distant location). Also note that **continuing professional education (CPE)** refers to meeting the educational needs of radiographers.

Please indicate your response by circling the number most appropriate for **your opinion** towards the following statements about **distance education**.
SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree, NS = Not Sure

78. I am familiar with the concept of distance education.	SA	A	D	SD	NS
79. Planning a continuing professional education (CPE) activity through distance education is too time consuming.	SA	A	D	SD	NS
80. Planning a CPE distance education activity would interfere with my obligations as a Radiologic Technology instructor.	SA	A	D	SD	NS

81. There are too many problems with the scheduling and logistics of distance education activities.	SA	A	D	SD	NS
82. Distance education is a fad.	SA	A	D	SD	NS
83. Individuals who participate in distance education learn just as effectively as individuals who attend on-site programs.	SA	A	D	SD	NS
84. Distance education activities are too impersonal.	SA	A	D	SD	NS
85. I am familiar with the distance education programs my institution offers.	SA	A	D	SD	NS
86. My department offers distance education programs.	SA	A	D	SD	NS
87. Radiologic Technology programs should offer continuing professional education (CPE) activities through distance education.	SA	A	D	SD	NS
88. I am willing to offer a CPE activity through distance education.	SA	A	D	SD	NS
89. Distance education would provide radiographers with greater accessibility to CPE activities.	SA	A	D	SD	NS
90. I would like for our institution to form partnerships with our area hospitals whereby the Radiologic Technology faculty provide radiographers with CPE activities through distance education.	SA	A	D	SD	NS
91. Offering CPE through distance education would be beneficial for radiographers who work in area hospitals.	SA	A	D	SD	NS
92. Radiographers would rather attend on-site CPE activities than participate in ones offered through distance education.	SA	A	D	SD	NS
93. Our institution offers adequate training in distance education.	SA	A	D	SD	NS
94. Distance education training sessions are offered during times that are not convenient for me.	SA	A	D	SD	NS
95. My institution does not provide adequate technical support for instructors who provide distance education programs.	SA	A	D	SD	NS
96. I currently feel comfortable using the technology required to provide CPE programs through distance education.	SA	A	D	SD	NS

97. Training for distance education takes more time than I have.	SA	A	D	SD	NS
98. I have participated in a distance education training session.	SA	A	D	SD	NS
99. My institution encourages instructors to provide distance education programs by offering compensations.	SA	A	D	SD	NS
100. Radiologic Technology instructors who provide CPE through distance education should be compensated in some form (i.e., extra pay, time-off, etc.).	SA	A	D	SD	NS
101. The community college should expect Radiologic Technology educators to provide CPE through distance education as a part of their job descriptions.	SA	A	D	SD	NS
102. Regardless of compensation, I am not interested in offering area radiographers CPE through distance education.	SA	A	D	SD	NS
103. Compensation for providing distance education programs would encourage Radiologic Technology faculty to offer CPE to area radiographers.	SA	A	D	SD	NS

IV. **Continuing Professional Education**

For the purposes of this survey, **continuing professional education (CPE)** refers to meeting the educational needs of radiographers.

Please indicate your response by circling the number most appropriate for **your opinion** towards the following statements about **continuing professional education**.
SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree, NS = Not Sure

104. CPE promotes professionalism in radiographers.	SA	A	D	SD	NS
105. CPE helps radiographers keep abreast of new technologies and skills.	SA	A	D	SD	NS
106. Radiographers who participate in CPE apply the new information.	SA	A	D	SD	NS
107. CPE increases the quality of patient care.	SA	A	D	SD	NS
108. CPE has made me a more effective instructor.	SA	A	D	SD	NS
109. CPE should focus on growth related issues (i.e., self-esteem, communication) in addition to technical skills.	SA	A	D	SD	NS
110. CPE allows radiographers to explore other areas of interest within the Radiologic Technology field.	SA	A	D	SD	NS

111. I find CPE activities to be stimulating.	SA	A	D	SD	NS
112. Participating in CPE makes me feel better about my skills and knowledge.	SA	A	D	SD	NS
113. Participating in CPE activities motivates me to perform better at work.	SA	A	D	SD	NS
114. CPE is a waste of my time.	SA	A	D	SD	NS
115. CPE is not necessary in order for radiographers/educators to perform well at work.	SA	A	D	SD	NS
116. Radiographers are more interested in obtaining credit than learning.	SA	A	D	SD	NS
117. I enjoy participating in continuing professional education (CPE) activities.	SA	A	D	SD	NS
118. Money spent on CPE is money well spent.	SA	A	D	SD	NS
119. I would not participate in CPE if it were not required.	SA	A	D	SD	NS
120. CPE is less important for radiographers than it is for other health care professionals.	SA	A	D	SD	NS
121. Participating in CPE activities makes me uncomfortable.	SA	A	D	SD	NS
122. Participating in CPE should be left to the discretion of the radiographers.	SA	A	D	SD	NS
123. CPE activities are not easily accessible.	SA	A	D	SD	NS
124. Attending professional meetings are a good means for obtaining CPE credits.	SA	A	D	SD	NS
125. Reading journals are a good means for obtaining CPE credits.	SA	A	D	SD	NS
126. Watching video tapes are a good means for obtaining CPE credits.	SA	A	D	SD	NS
127. There are not enough options available for me to obtain continuing education credits.	SA	A	D	SD	NS
128. I would enjoy conducting CPE programs.	SA	A	D	SD	NS
129. I am not comfortable teaching other radiographers.	SA	A	D	SD	NS
130. Community colleges should provide some means of offering CPE to area radiographers.	SA	A	D	SD	NS

131. Radiologic Technology instructors should not be asked to offer CPE programs in addition to their regular work loads. SA A D SD NS

132. Radiographers who work in area hospitals should not expect Radiologic Technology educators to offer CPE programs. SA A D SD NS

133. I would be willing to offer CPE for some form of compensation from my institution. SA A D SD NS

V. **Partnerships in Continuing Professional Education**

134. Many colleges and universities are joining in partnerships with businesses and industries for the purpose of offering continuing education through distance education. Does your Radiologic Technology department have partnerships with area hospitals to provide radiographers continuing professional education activities through *distance education*?

___ Yes ___ No

If "Yes", how many programs are offered per year? ___

135. Does your department provide *any* type of continuing professional education service for area hospital radiographers?

___ Yes ___ No

If you answered "Yes", please continue with question 136. If you answered "No", Thank you for taking time to complete this survey. Please return in the enclosed self-addressed stamped envelope.

136. Please indicate in the space below *how* your department provides continuing professional education programs (e.g., loan video tapes, lectures) to area hospital radiographers.

137. For each instructional method you indicated in question 136, please indicate *how often* each method is used to provide continuing professional education programs to area hospital radiographers.

Appendix B

Letter of Explanation for the Radiologic Technology Program Director

8516 Falkirk Ridge Court
Wake Forest, North Carolina 27587

November 23, 1998

Dear Radiography Program Director:

My name is Lauren Noble and I am a Radiography Instructor at Vance-Granville Community College in Henderson, North Carolina. I am completing a Doctorate Degree in Adult and Community College Education at North Carolina State University in Raleigh. As a part of my course of study, I am required to conduct a research study. My area of interest deals with Radiography faculty opinions towards instructional technology, distance education, and continuing professional education.

Your community college has been randomly selected to participate in this study. Your responses are greatly appreciated. It should take approximately 10-15 minutes to complete the enclosed survey. Your responses will be held confidential and used for research purposes only.

Information regarding the names and number of Radiography faculty members at each community college nationwide is unavailable. Therefore, I am asking each Program Director to please distribute the surveys and self-addressed stamped envelopes to all of their full-time faculty members. I had to estimate the number of surveys (based on program size) each Radiography program would require; hence, you may have been sent either too many or too few surveys. If you have too many surveys, please return them or discard them. If you have too few, please distribute them to full-time faculty members willing to complete them; or, if you have too few and would like additional surveys, please call me, collect, at (919) 556-8968.

Lastly, please return the enclosed form with the number of faculty members who received surveys. This information will be used to calculate the survey response rate.

Thank you for your time.

Sincerely,

Lauren Noble, MS, RT(R)

Appendix C

Letter of Explanation for the Radiologic Technology Faculty

8516 Falkirk Ridge Court
Wake Forest, North Carolina 27587

November 23, 1998

Dear Radiography Instructor:

My name is Lauren Noble and I am a Radiography Instructor at Vance-Granville Community College in Henderson, North Carolina. I am completing a Doctorate Degree in Adult and Community College Education at North Carolina State University in Raleigh. As a part of my course of study, I am required to conduct a research study. My area of interest deals with Radiography faculty opinions towards instructional technology, distance education, and continuing professional education. This research is intended to profile the existing relationship between community colleges, Radiography faculty, and area hospitals. It is anticipated that the information gathered from this research may be beneficial in assisting community colleges, faculty, and area hospitals join together to make continuing professional education more accessible for radiographers who work in these hospitals.

Your community college has been randomly selected to participate in this study. Your responses are greatly appreciated. It should take approximately 10-15 minutes to complete the enclosed survey. Your responses will be held confidential and used for research purposes only. On the reverse side of this letter is an Informed Consent Form (which is required by the university) that you are asked to sign and return, along with the survey, in the self-addressed stamped envelope. Please return by: December 14, 1998

Thank you for your time.

Sincerely,

Lauren Noble, MS, RT(R)

Appendix D

Informed Consent Form

North Carolina State University
INFORMED CONSENT FORM

TITLE: Creating Integrated Facilities: Community College Radiologic Technology Faculty Attitudes Towards Instructional Technology, Distance Education, and Continuing Professional Education

PRINCIPLE INVESTIGATOR: Lauren Brower Noble FACULTY SPONSOR: Dr. Conrad Glass

You are invited to participate in a research study. The purpose of this study is to find out the opinions of community college Radiologic Technology faculty concerning instructional technology, distance education, and continuing professional education. In addition, this research investigates what Radiologic Technology faculty may currently be doing, or plan on doing, regarding the provision of continuing professional education to radiographers who work in area hospitals.

INFORMATION
1. a. The Program Directors from the randomly selected community college Radiologic Technology Programs are asked to distribute questionnaires to their faculty.
   b. The faculty participants are asked to complete a questionnaire to be returned in a self-addressed stamped envelope.
2. It will take each participant approximately 15 minutes to complete the questionnaire.

RISKS
No known risks are associated with completing this questionnaire. Identification of the participant and his/her responses on the questionnaire is not possible.

BENEFITS
This research is expected to provide information on the opinions of community college Radiologic Technology faculty regarding instructional technology, distance education, and continuing professional education. The researcher anticipates that this information may be beneficial in helping community colleges, faculty, and radiographers join together to make continuing professional education more accessible for radiographers who work in area hospitals.

CONFIDENTIALITY
The information in the study records will be kept strictly confidential. Data will be stored securely and will be made available only to persons conducting the study unless you specifically give permission in writing to do otherwise. No reference will be made in oral or written reports which could link you to the study.

COMPENSATION
No compensation is provided for participating in this study.

EMERGENCY MEDICAL TREATMENT
Not Applicable

CONTACT

If you have questions at any time about the study or the procedures, you may contact the researcher, Lauren Brower Noble, at 8516 Falkirk Ridge Court, Wake Forest, NC, 27587, or at (919) 556-8968. If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact the Dr. Gary A. Mirka, Chair of the NCSU IRB for the Use of Human Subjects in Research Committee, Box 7906, NCSU Campus

PARTICIPATION

Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed your data will be returned to you or destroyed.

CONSENT

I have read and understand the above information. I have received a copy of this form. I agree to participate in this study.

Subject's signature_____ Date_____

Investigator's signature_____ Date_____

Appendix E

Note Indicating the Number of Surveys Distributed to the
Radiologic Technology Faculty by the Program Director

FACULTY RESPONSES

Please indicate how many surveys you distributed to your full-time faculty members and return this form in the enclosed self-addressed stamped envelope.

_____ surveys were distributed to full-time faculty members.

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Sign here, please

Signature: Dr. Lauren B. Noble	Printed Name/Position/Title: Lauren B. Noble / Radiography Instructor
Organization/Address: Home address: 8104 Sandybrook Ln. Wake Forest, NC 27587	Telephone: 919-556-8968 FAX:
	E-Mail Address: Noble@vgcc.edu Date: July 3, 2002

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